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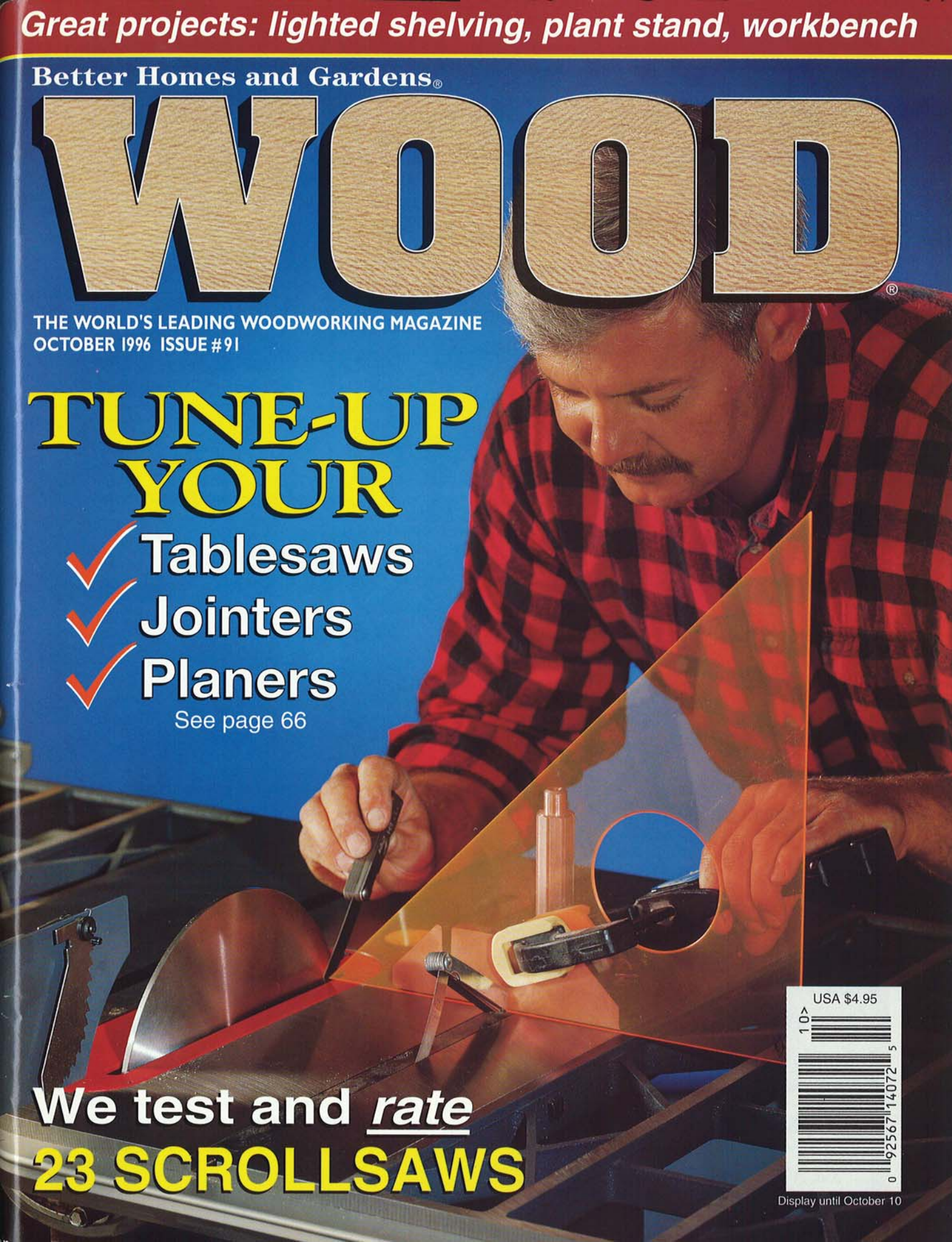
See page 66



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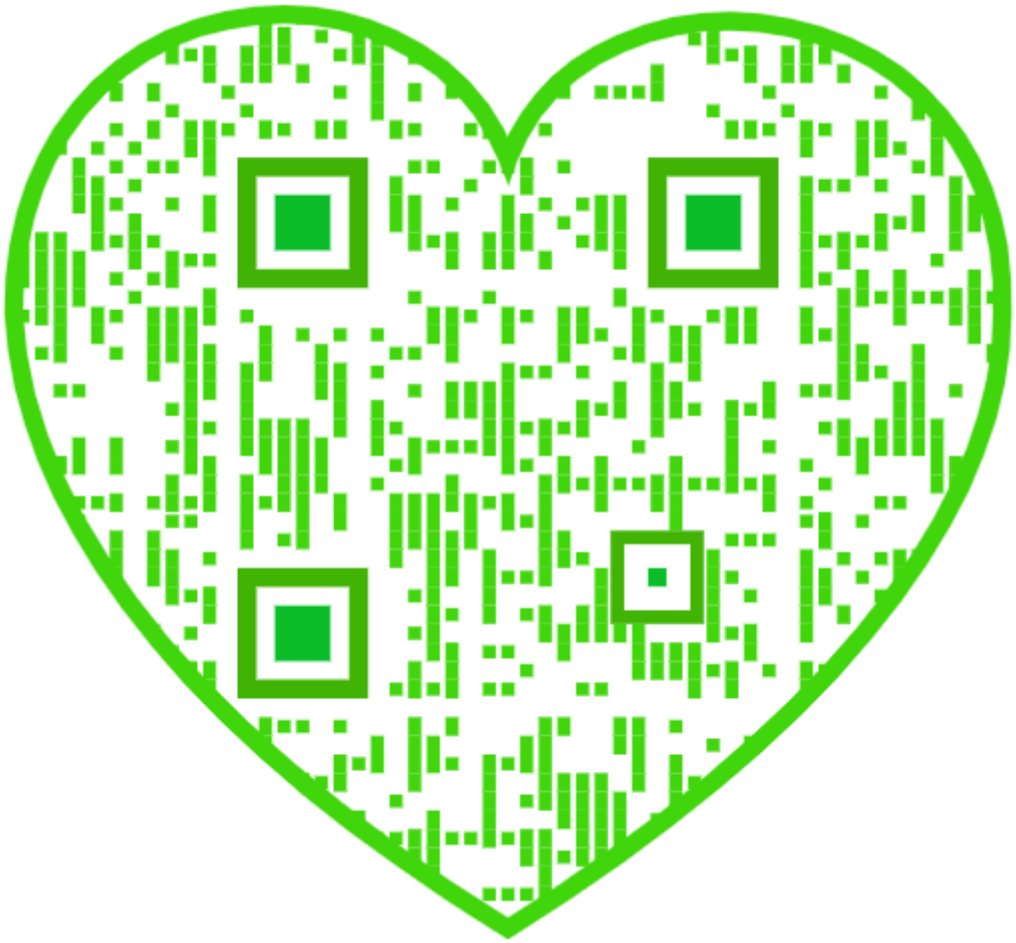

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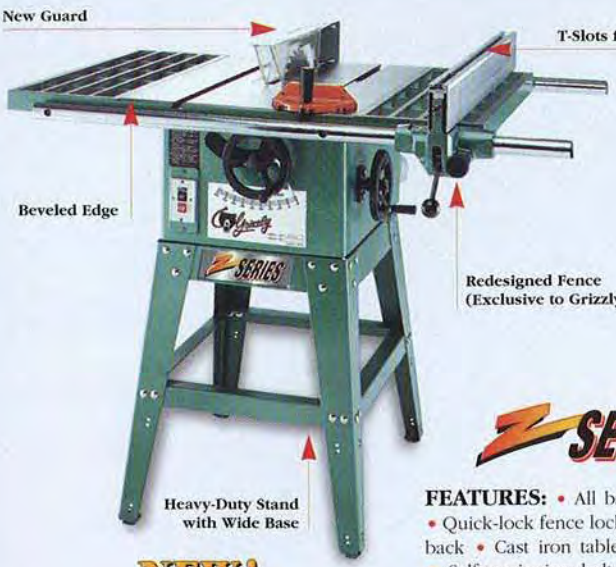

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Now appearing on WOOD ONLINE:

Check out the Woodworker's Software Library, a collection of woodworking shareware programs you can download to run on your computer. In the library you'll find a foot-inch-fraction calculator, a program for generating cutting diagrams, another that figures tilt and miter settings for compound miters, and one that lays out templates for cutting dovetail joints.

To connect to the internet, go to http://woodmagazine.com, then click on the button for Woodworker's Software Library.

THE EDITOR'S ANGLE

Turned wooden hats? You bet!

Just a few of the many hat styles that Johannes Michelson turns in his rural Vermont woodshop.

It was during our last staff issue-planning meeting when our features editor Pete Stephano suggested that we do an article on Johannes Michelson, a Vermont hatmaker. Eyebrows raised around the room. Most of us have been around woodworking long enough to know that you can make almost anything from wood. But hats?

It's true, folks! And they're impressive beyond belief. It turns out that Johannes, formerly a home builder and stair maker, just happened to think of this novel idea after reading an article about David Ellsworth's thin-walled bowls and a book on wood movement by Bruce Hoadley.

Although this craftsman has been turning his hats for only six years, his end product will amaze you. Whether you're a woodturner or not, be sure to treat yourself to Pete's article, "Hats Off to Turning," beginning on *page 39*.

P.S. The staff and I were so interested in Johannes' technique that we asked him to come to Des Moines to show us how he does his thing.

On another note, be sure to check out our 1997 Build-A-Toy® contest rules on *page 17*. As always, the prizes are great, and often worth over several thousand dollars. More importantly, proceeds from the contest go to needy kids across the country.

Project Showcase—It's Back!

Those of you who have been with us for several years will remember that we used to have a feature called "Project Showcase" in *WOOD*® magazine. In it, we featured projects built by our readers as a way of giving a tip of the hat to quality craftsmanship.

Now, after a hiatus of several years, we're making room for "Project Showcase" again. Starting with this issue, we'll run it two times a year. The first time out, we'll show you some of the work the *WOOD* magazine staff have been doing. After that, it's a readers-only feature. Be sure to see *page 37* for information on submitting your woodworking projects for consideration.♣

Larry Clayton

Print this article

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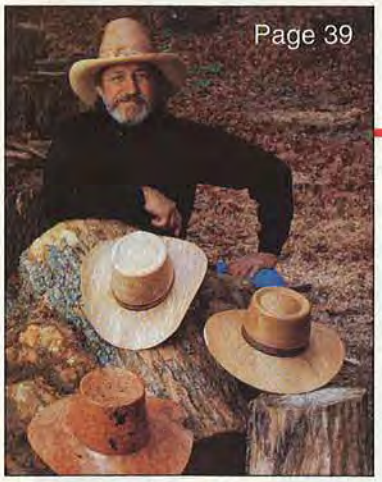

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This issue's cover wood grain: Sycamore

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THIS SIDE OUT

4 teeth per chipper for super smooth flat bottom dadoes.

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When we listen to woodworkers, we understand what you mean — after all, we are woodworkers! You told us you needed a dado to cut plywood, solid wood, hardwood veneered plywood, laminates and melamine *chip-free.* You told us that it needed to cut precise slots and maintain accuracy. And it especially needed to accommodate today's undersized plywoods.

So we engineered a dado that would not only meet your needs, but would surpass your expectations. First we started with our superior tri-metal brazing to bond a special tooth design to an extra stiff blade body. You wanted dadoes with super smooth flat bottoms so we included 4-wing chippers. You said you hate it when chips build up in the chippers, so we perfected a gullet which ejects the chips. And then we eliminated the hub on the outside blade so chips cannot build up between the blades. The Super Dado will cut all your materials chip-free with a dado so smooth, you'll hate to cover it up.

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And speaking of safety, we used the same anti-kickback technology associated with our saw blades and router bits. It's the anti-kickback shoulder design that reduces the chance of kickback from overfeeding. This higher level of safety lets you dado with confidence.

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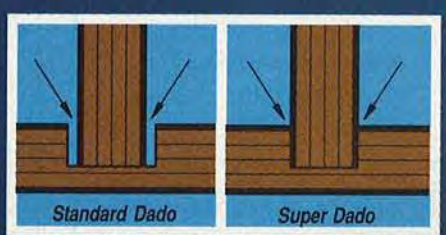

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TALKING BACK

Wants to know what's going on with CMT

In your August 1996 issue, No. 89, you recommended CMT router bits in an article on stile and rail cutters. At the time, I couldn't agree with you more. Since 1993 I have purchased only CMT router bits because of their high quality. However, when I recently ordered a stile and rail set from CMT, and compared it to a set I purchased in 1995, I noticed there was a definite difference. It appears to me that CMT has reduced its quality.

When I called CMT to inquire about this change, the response from the technical support division was that all of the bits shipped in the U.S. are now manufactered in the U.S., and the new manufacturing plant in the U.S. is using different specifications than the previous bits that I received which were manufactured in Italy. They assured me that these new bits would perform just as good as the ones shipped from Italy, and I am sure that they will, but I feel that when you are paying top dollar for the best router bits, they better be top quality. For my future purchases, perhaps I'll fly to Italy.

—Bernard J. Bobinski, Riverbead, NY

Don't contact your travel agent just yet, Bernard. You can still buy the Italian-made CMT bits through distributors that deal with the Italian manufacturer's office in this country—CMT USA, P.O. Box 4185, Greensboro, NC 27404-4185. Call 910/854-0201 for the dealer nearest you.

Although CMT USA and CMT Tools of Oldsmar, Fla. both sell router bits, sawblades, and other tooling labeled CMT, the companies are separate. CMT Tools formerly imported the Italian-made products, but now has its own manufacturing plant in Florida.

We welcome comments, criticisms, suggestions, and even compliments. Send your correspondence to: Talking Back, *Better Homes and Gardens® WOOD®* Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. To contact us via computer, use these on-line addresses: CompuServe: 74404,3516 Internet : 74404.3516@compuserve.com

In our conversations with representatives of both CMT USA and CMT Tools, it is clear that both companies are aware of the market confusion created by this situation, and that both companies desire a solution. To that end, the companies are engaged in legal proceedings that may take some time to conclude.

We have previously tested and reported on the Italian-made router bits, and like you, found the quality to be top-notch. Now, we're waiting for the legal dust to settle before reporting on the U.S.-made bits from CMT Tools. In the meantime, you can easily distinguish the two bits because both are marked with their respective countries of origin.

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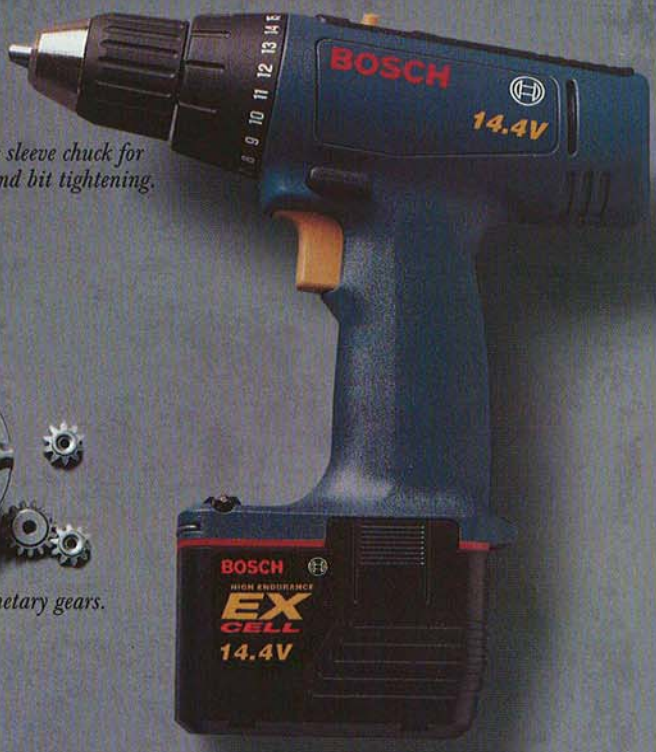

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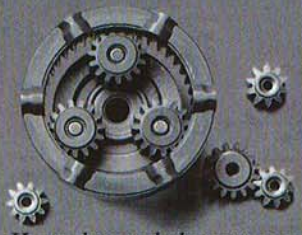

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BUILD-A-TOY® WINNERS
Tell all...almost

Want to capture a prize in *WOOD*® magazine's 1997 Build-A-Toy Contest? Then heed this advice from two perennial winners.

In the seven-year history of the annual Build-A-Toy contest, two names consistently have appeared high on the winners' list in the professional division. So we thought there just might be a toy-building secret or two they'd be willing to share with would-be entrants. And their advice comes just in time for you to craft a toy for the 1997 edition of Build-A-Toy, which is announced on *page 17.*

Mike Jagielo is a 37-year-old furnituremaker from Almond, Wisconsin. Here's his sterling record in the contest's professional division:
1989, Special Citation.
1990, Best Finish.
1991, Grand Prize, Best Pull Toy.
1992, First Prize, Best Finish, Best Pull Toy.
1994, Grand Prize.
1995, Grand Prize, Best Pull Toy.

Humor and motion, a winning combination

According to Mike, the 1989 toy contest was the first woodworking contest of any kind that he had entered. "Part of the reason I did—and still do—was that toys represent a welcome change for me. I really don't make any toys, except for the Build-A-Toy contest," he says. "And prizes were attractive, but the fact that it is a charity event for underprivileged kids was an important factor."

To win the grand prize in 1994, Mike crafted this creepy, crawling spider with moving legs.

This crab pull toy by Mike walked off with the grand prize in 1995.

And that first entry taught him a few things. "I didn't have enough self-confidence to think that I would really win anything, but I did think that an original design would rate higher in the judges' eyes," Mike recalls. His 1989 entry, an apple pull toy with an animated pop-up worm, won only a citation. "It did have a few rough edges, like the stem that stuck out of the top," Mike admits. "For safety reasons, the judges might have frowned on it. Since then I've designed my toys around the rules, such as smooth edges and no small parts that children could swallow."

Mike's 1990 entry, a tumbling acrobat pull toy, earned a citation for best finish. After that, he pulled out all the stops, and has won either a grand prize or a first place nearly every year.

Part of Mike's winning record he owes to the pull-toy action mechanism he developed beginning in 1991. No matter the body style, the leg action looks like the rowing oars of a galley ship—back and forth, all in unison. "Then, I try to take something from nature that has a movement like my mechanism produces," he explains. "I think about something that might be appealing in that type of motion, such as a ladybug, spider, or a crab [see photos *this page*]. And I mean appealing to children as a toy, and secondarily to the judges.

Mike Jagielo's original animated all-creature pull toy was this ladybug from 1991.

"The toy should be humorous, too," he adds. "In the contest over the years, I've seen so many trucks and boats and other typical toys that I try to do something that's really unique."

Mike also covers the bases. "With the different citation categories in the contest, such as best use of wood or best clear finish, or best pull toy, I try to build an entry that will have a chance to win something in as many categories as possible."

And he feels that finish is important. "I try to use a number of wood species and leave them their natural color with a few coats of Minwax Antique Oil Finish," he says. "But a good finish really gets down to the sanding. I usually end with 220-grit, sanding all the parts before assembly."

Continued on page 10

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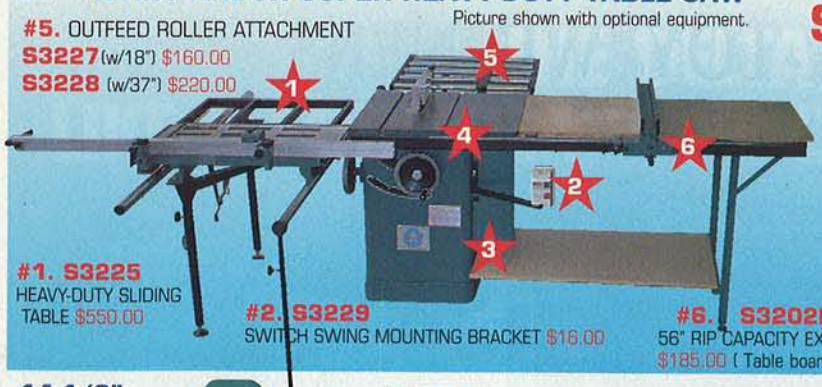

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•1 H.P., 110/220V

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8" x 65" SUPER HEAVY DUTY JOINTER

4"JOINTER ALSO AVAILABLE

•1 1/2 H.P., 220V

S3102

$665.00

(OPTIONAL HAND CRANK ADJUSTMENT KIT ON INFEED AND OUTFEED TABLE ALSO AVAILABLE)

6" x 30" FLOOR STAND EDGE SANDER

(BENCH TOP MODEL ALSO AVAILABLE)

•1 1/2 H.P., 110/220V

S3406

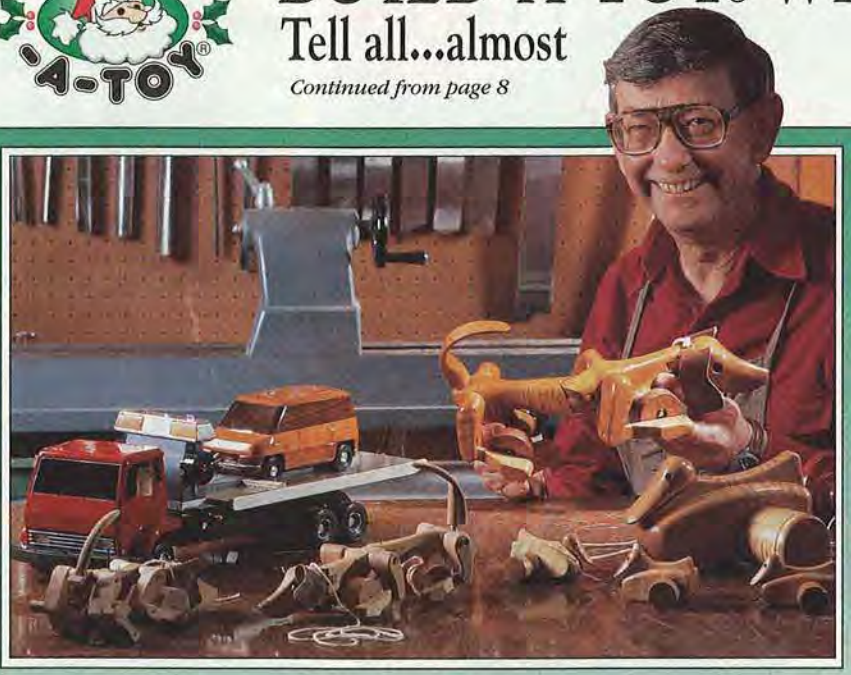
$490.00

* PRICES & SPECS. ARE SUBJECT TO CHANGES WITHOUT NOTICE.

BUILD-A-TOY® WINNERS

Tell all...almost

Continued from page 8



A retired industrial designer and design engineer for Eastman Kodak, Neil Seely, 62, walked off with the top professional prize for a pull toy in the very first contest. Since then, he has racked up quite a record from his woodworking shop in Rochester, New York.

1989, Grand Prize.
1990, First Prize and Best Painted Finish.
1991, First Prize.
1992, Grand Prize, Best Use of Wood, Best Truck.
1993, Second Prize, Best Pull Toy.
1994, Second Prize.
1995, Second Prize.

Keep those judges entertained

"Careful workmanship is very much a part of winning in the Build-A-Toy contest," Neil advises. "And originality—a design has to be a cut above the average. So, I try to do something that I haven't done before. And I can afford to make my entry somewhat complex because I'm only making one of them [actually two—he keeps one]."

Although he takes pride in producing a winner, Neil feels that the contest's prizes are a bonus. The real reward for entering is the creation of a new toy design. And unlike his contest competitor Mike Jagielo, Neil gives little thought to categories and extra citations. "I just want to develop the idea I have for the toy, and then see where it falls," he says.

Here's how his 1995 second-prize winning toy came about.

In 1992, Neil Seely captured yet another grand prize with this tractor/trailer rig.

"The idea behind my UFO pull toy [shown *below left*] came from a thought I had that a 1½-year-old child would be perfectly content pulling a block of wood around the house. Just drill a hole in it and attach a string. But a rectangular block would catch on everything. So, it would have to have the corners rounded off. Then, it would look like a UFO. Eventually, I elaborated on that a little bit by adding noise with jingle bells inside. Of course, for the parents' benefit, there are times when it should be quiet, too, so I made it silent-running when it is flipped over."

Neil encourages anyone with an idea to keep at it. "Don't give up because it's not working out. Just work on it a little harder. Or, put it on the back burner for a while and maybe a light will come on and you will know what to do."

This craftsman's toy entries (see photos on *this page*) have ranged from the simple to the complex. One common factor they have all shared, however, is a degree of fascination. And if Neil has any one strategy for winning, it's that.

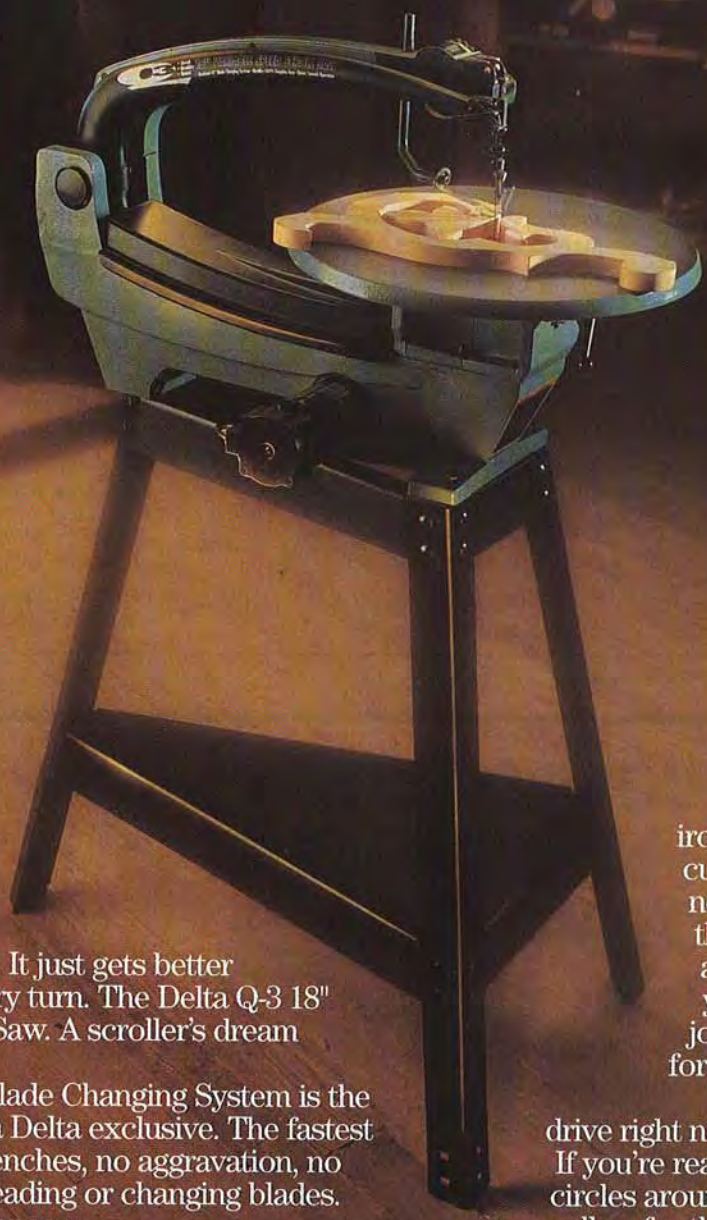
"My biggest secret—that I probably shouldn't tell—is that I try to keep the judges entertained longer with my toy than anyone else does," says Neil. "I believe that if I can keep them playing with my entry for five minutes longer than the others, they'll feel that they ought to give me a prize. Otherwise, they've wasted their time! I think that's the game Mike Jagielo plays, too. He really gets them enchanted."

A noise-making UFO pull toy earned Neil a second prize in 1995.

The New York craftsman's waddle duck was a 1989 contest grand-prize winner.

Written by Peter J. Stephano
Photographs: Jim Kascoutas, John Hetherington, David Brennon, Mary Jagielo

THE DELTA Q-3.
LIKE A FORMULA RACE CAR WITH A BLADE.



We're talking pleasure here. Precision. Power. Wait 'til you get your hands on this high-performance machine. It just gets better and better around every turn. The Delta Q-3 18" Variable Speed Scroll Saw. A scroller's dream machine.

Its Quickset™ II Blade Changing System is the second generation of a Delta exclusive. The fastest in the industry. No wrenches, no aggravation, no wasted time while threading or changing blades. You'll find it on no other saw.

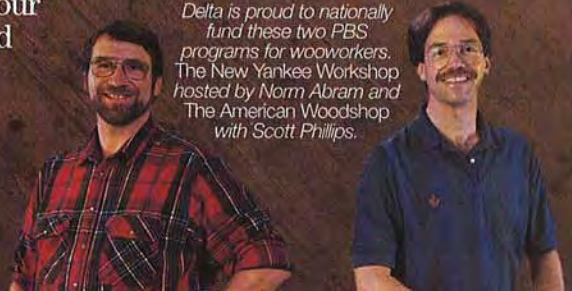
The arched, graphite composite arm eliminates vibration. So smooth and quiet you can listen to the sweet sound of your blade cutting wood, instead of your saw breaking the sound barrier. And at the very tip of that graphite arm you'll find the control switches. Right under your nose, instead of having to fumble around below the table.

Visit us on the WEB:
http://www.deltawoodworking.com/delta

As you'd expect, the cast iron table tilts to allow bevel cutting. But what you might not expect is the fact that the adjustable steel stand also tilts forward to give you a better view of the job, and just the right angle for comfortable operation.

This one's ready to test drive right now at your Delta dealer.

If you're ready to cut circles around the rest, call us for the dealer nearest you. Delta International Machinery Corp., 800-438-2486. In Canada, 519-836-2840.



Delta is proud to nationally fund these two PBS programs for wooworkers. The New Yankee Workshop *hosted by Norm Abram and* The American Woodshop *with Scott Phillips.*

THE POWER OF THE PROS

DELTA
WOODWORKING MACHINERY
A Pentair Company

1995 CRAFTED FOR JOY TOY AUCTION

TOP MONEY RAISERS

Mike Jagielo's happy crab pull toy raised $545.

Find out which Build-A-Toy® entries sold best

WOOD® magazine readers' Build-A-Toy entries from across the nation raised enough for $18,000 in toys for Christmas distribution by the U.S. Marine Corps Reserve's Toys for Tots program. Entries that brought at least $100 at the 1995 Crafted for Joy toy auction held November 15, 1995, in Des Moines were notified by letter. Here are some toys that exceeded $100 in the bidding. Thanks, entrants. Let's look to an even better 1996 money raiser!

Mike Jagielo, Almond, Wis.
Crab pull toy, $545.

Robert C. Bretz, Decatur, Ill.
Semi with road grader, $500.

Hank Gorczynski, Batavia, N.Y.
N.Y. Central tugboat, $470.

WOOD *magazine, Des Moines, Iowa*
Walnut rocking horse, $450.

Dee Cook, Lawrenceville, Ill.
Doll-sized kitchen cabinet, $400.

Robert Trace, Toledo, Ohio
Passenger train pull toy, $380.

Robert Benson, Tyler, Texas
Noah's ark rocking chair, $365.

Jack W. Dalton, Jackson, S.C.
Marine Corsair rider airplane, $350.

James Blyth, Huntersville, N.C.
Roscoe Rabbit airplane, $325.

Frank Risso, Paso Robles, Calif.
Semi truck with flatbed, $300.

Ken Barkley, North Palm Beach, Fla.
Riding car, $255.

William E. Sullivan, Weymouth, Mass.
Military six-by truck, $250.

Charles Frodl, Belmont, Mich.
Boxed alphabet train, $235.

Kerry Sadowsky, Fargo, N.D.
Tractor with disk, $230.

William Howe, Rolling Hills Estates, Calif.
Gypsy camper truck, $230.

Jerry Eaton, Eau Claire, Wis.
Pickup camper w/canoe, $225.

Art Bartelme, Fort Pierce, Fla.
Dodge truck with 1910 Ford on trailer, $225.

George Campbell, Owensboro, Ky.
Corsair airplane, $220.

Harold Clark, Greensburg, Kan.
Cherry vault savings bank, $180.

John Gentile, Goose Creek, S.C.
Log cabin bank, $175.

Peter Friedel, Baltimore, Md.
Car with rumble seat, $175.

Robert Thompson, Harrisburg, Pa.
Jeep and driver, $170.

Harold Clark, Greensburg, Kan.
Walnut vault savings bank, $170.

$50 REBATE.
Contractor's Saw® with any Unifence,® Biesemeyer® Fence or Precision Saw Guide. (Shown here with Biesemeyer Homeshop Fence and accessory table board and legs.)

$50 REBATE.
14" Band Saw with 3/4 hp Model #28-275
14" Band Saw with 1 hp Model #28-280

$100 REBATE.
DJ-20 8" Jointer with any motor configuration.

$75 REBATE.
DJ-15 6" Jointer with any motor configuration.

$50 REBATE.
Cabinet Shaper Model #43-355

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WOOD ANECDOTE

Ailanthus

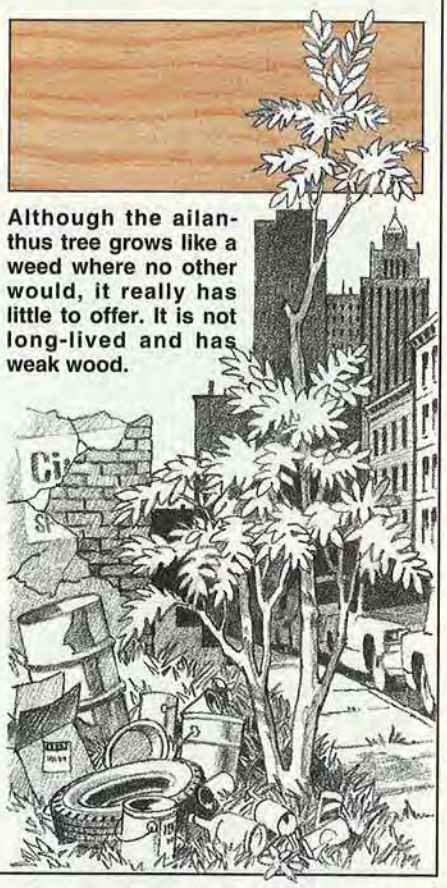
The tree that you really don't want to grow

For some unknown reason, the tree that many people call "tree of heaven" or "paradise tree" after its Chinese local name, was brought to North America from the Far East in the late 1700s. The bearer must have meant well, for the ailanthus (*Ailanthus altissima*) isn't a terrible-looking tree. It grows straight—to 60' or 80' tall—and quickly.

You'll find it in a wide "natural" range that stretches from the Plains States to the East Coast and northern Michigan to Florida's panhandle. In fact, heat or cold doesn't hinder this species much. Nor poor soil. Nor city smog and smoke. Even dryness won't bother it. And the tree can survive submergence in salt water. So, there's little to stop its propagation (it spreads by seeds and sprouts from its deep root system). In many places, the ailanthus has become a real nuisance by aggressively crowding out native or ornamental species.

So why give this tree a bad rap? For one thing, it stinks. The blossoms of the male ailanthus produce a stench. The leaves and wood also have a formidable and unpleasant odor. And, it's not a very convincing shade tree. Nor does ailanthus live long—maybe 75 years. Lastly, ailanthus wood *looks* like white ash, but is weak and brittle.

Ailanthus' only claim to fame is that it is the tree referred to in the book and motion picture *A Tree Grows in Brooklyn*. Unfortunately, it really does.



Although the ailanthus tree grows like a weed where no other would, it really has little to offer. It is not long-lived and has weak wood.

Illustration: Jim Stevenson

$25 REBATE.
12" Variable Speed Lathe Models #46-700/701 with or without stand.

$50 REBATE.
15" Planer with stand Model #22-675

TODAY, YOU'LL APPRECIATE THE REBATES. LATER ON, YOU'LL APPRECIATE THE QUALITY.

Here's a chance that doesn't come along every day. A chance to put Delta Quality in your shop and get a check in the mail from Delta to boot. But only from September 1-December 31, 1996.

Granted, that rebate check will probably be spent by the time you get around to cashing it. But that new Delta machine will become more valuable each time you flip the switch. And you can take that to the bank.

Call for the name of your nearest participating Delta dealer. Delta International Machinery Corp., 800-438-2486. In Canada, 519-836-2840.

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DELTA
WOODWORKING MACHINERY
A Pentair Company

Delta is proud to nationally fund these two PBS programs for woodworkers. *The New Yankee Workshop* hosted by Norm Abram and *The American Woodshop* with Scott Phillips.

Our super-sturdy SCROLLSAW STAND

Elevate your benchtop scrollsaw to new heights with this sturdy shop-made stand. It provides solid support directly beneath the saw to help minimize vibration.

We recommend that you elevate the scrollsaw table to a comfortable height, typically at elbow level. So, you may have to adjust the height of the uprights (C) slightly. We dry-clamped our pieces together before drilling the mounting holes to verify a comfortable working height.

For additional strength, drill the mounting holes, and drive the lag screws through the uprights (C) and feet (D) and into the ¾" dowels in the mating pieces.

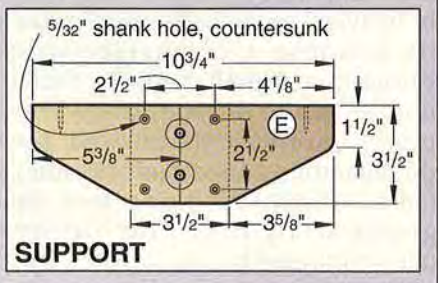
Project Design: James R. Downing
Illustrations: Roxanne LeMoine
Photograph: Dean Tanner

Bill of Materials

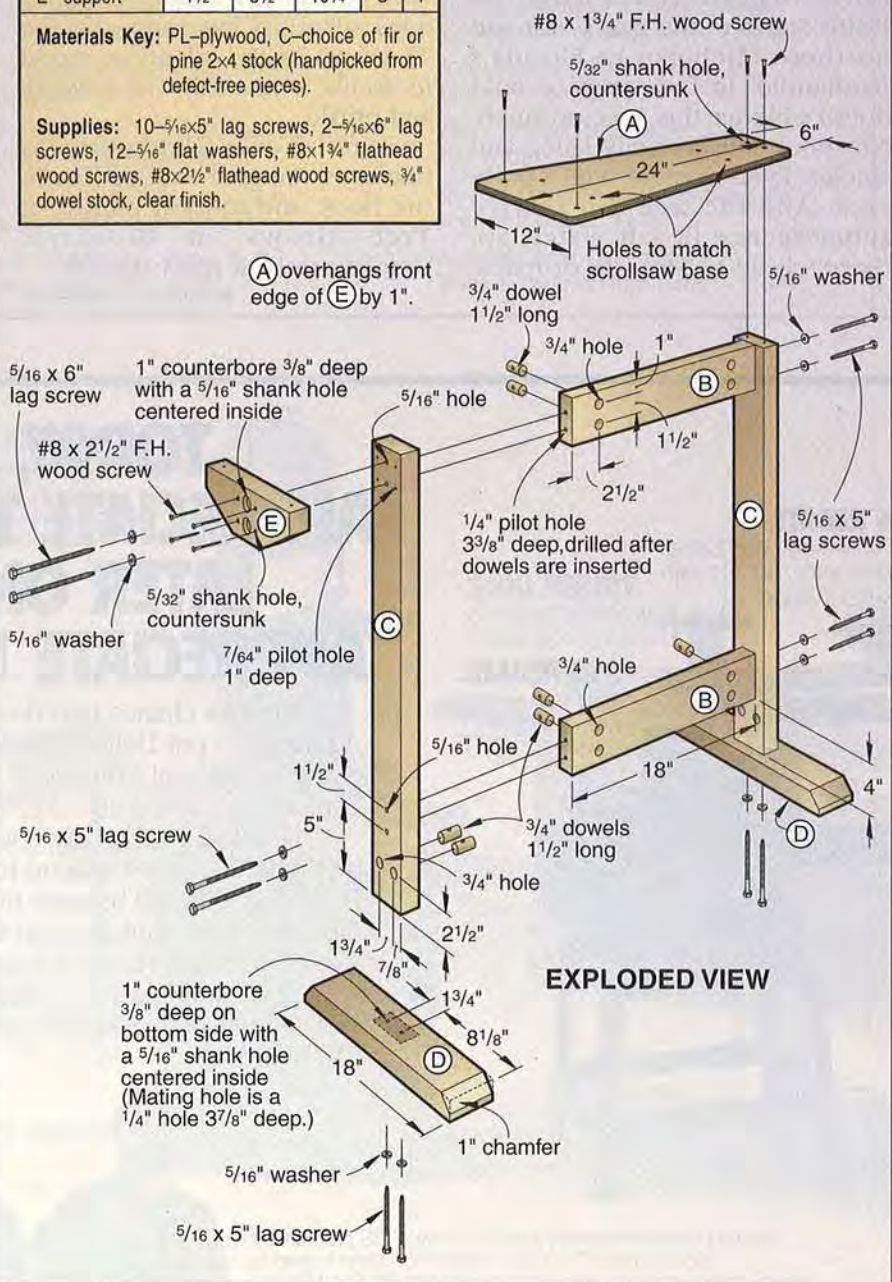
Part	Finished Size T	W	L	Matl.	Qty.
A top	¾"	12"	24"	PL	1
B cross members	1½"	3½"	18"	C	2
C uprights	1½"	3½"	31½"	C	2
D feet	1½"	3½"	18"	C	2
E support	1½"	3½"	10¾"	C	1

Materials Key: PL–plywood, C–choice of fir or pine 2×4 stock (handpicked from defect-free pieces).

Supplies: 10–5/16×5" lag screws, 2–5/16×6" lag screws, 12–5/16" flat washers, #8×1¾" flathead wood screws, #8×2½" flathead wood screws, ¾" dowel stock, clear finish.



SUPPORT



FOR THOSE OF YOU WHO KNOW BETTER THAN TO CONSIDER AN IMITATION.

Limited Edition Unisaw® includes 52" Unifence®, 50-tooth ATB combination blade, chrome handles and personalized insignia plaque.

Your choice of Unifence or Biesemeyer® Fence available on all models other than Limited Edition.

A HUNDRED DOLLAR REWARD FROM DELTA.

Old-timers will tell you that you're not just buying that Unisaw for right now. You're buying it for what it'll be doing for you ten, fifteen—maybe twenty years down the road. That's when you'll be glad you didn't try to save a couple hundred bucks way back in 1996—by settling for a saw that was touted to be as good as the Unisaw.

Feature for feature, the Unisaw stands unmatched, period. Equally important to consider, are parts and service. (Truth is, we can still provide parts and service today, for a 1937 Unisaw.)

All that said, we know how tempting it can be to save a few bucks by buying a knock-off from overseas. (Meanwhile—the Unisaw you've always wished for could be coming off our production line in Tupelo, Mississippi, as we speak.) This calls for a special deal.

Okay, here goes: Buy any Delta Unisaw between July 1 and December 31, 1996 and we'll send you a rebate check for $100. Even on this Limited Edition Unisaw, as seen on *The New Yankee Workshop*—a saw that'll be offered this one time only.

Call for the name of the Delta dealer nearest you where you can take advantage of this one-time offer. Delta International Machinery Corp., 800-438-2486. In Canada, 519-836-2840.

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Delta is proud to nationally fund *The New Yankee Workshop* hosted by Norm Abram on PBS.

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Just how strong is the Magna-Set™ Fence?

THE STRONGEST AND MOST ACCURATE ON THE MARKET - PERIOD!

Don't try this at home!

We hoisted this 500 pound tablesaw into the air to demonstrate the clamping power of our Magna-Set™ Fence. After letting it dangle in the air as shown for almost a whole day we brought the saw down and tested for accuracy. The fence showed no deflection on our dial indicator which measured in one thousandths of an inch. Not only was there no damage to the fence, but we were able to slide it with one finger!

PATENT PENDING

- Locks on both ends
- Fits saws with 27" tables
- Moves on ball bearing guides
- T-slotted for attaching fixtures
- Remains parallel to blade when unlocked
- Parallelism easily adjustable
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SEARS CRAFTSMAN
rbindustries The American Tool Manufacturer

Enter *WOOD*® magazine's 9th Annual Build-A-Toy® Contest

All entries from the 1997 Build-A-Toy contest will be sold at a public auction in November 1997, and the funds raised donated to the U.S. Marine Corps Reserve's Toys for Tots program to purchase new toys for needy children at Christmas. All Build-A-Toy contest entrants receive a colorful, "I Crafted a Toy for Joy" sticker.

Toys will be judged on Originality, Durability, Craftsmanship, Kid Appeal, Safety, and Finish. Only toys of your original design will be eligible for Best Toy Entry, and Grand through Third prize in the Home Hobbyist and Professional divisions. Toys built from plans as well as those of your original design will be eligible for all prizes in the Junior Craftsman division (ages 19 and younger) and all citation awards. The special award Best Entry from a Shop Class will be presented to the most outstanding entry (a multiple entry also qualifies) submitted by a shop class (elementary through high school) in the Junior Craftsman division.

Deadline for entries is September 1, 1997. Judging will take place in mid-September and winners will be notified by mail by mid-October. Names of winners will be published in *WOOD* magazine's September 1998 issue.

Turn the page to see more than $22,000 in tools and supply prizes!

Enter a Toy and You're Automatically Entered in Our Drawing!

When you enter a toy in the contest, you're automatically entered in a drawing to receive one of these great prizes:

- **3M™ Woodworker's Packet** — 3M™ 2" Sanding/Finishing Kit, 3M™ Aluminum Oxide Sandpaper, 3M™ Synthetic Steel Wool, 3M™ Sanding & Fiberglass Insulation Respirator, Scotch™ Painters' Masking Tape
- **Power Press pipe clamp spreader from American Tool**
- **WOOD Plan from *WOOD* magazine**

No toy necessary to enter. See Drawing Rules for full details.

PowerPress 3M

Home Hobbyists • Junior Craftsmen
Shop Classes • Professionals

ENTRY FORM

WOOD® magazine's 1997 BUILD-A-TOY® Contest

Please limit entries to 25 toys per individual or group. Please provide the following information for each entry submitted.

Division entering: ❑ Junior Craftsman ❑ Professional ❑ Home Hobbyist

My entry is: ❑ Original design* ❑ Built from plans

Check affiliation if applicable: ❑ Shop Class

*For Original Design entries: I certify that I have designed and built this toy myself. Should my entry win, I agree to cooperate with *WOOD* magazine to supply builder's notes and a bill of materials for publication.

Signature_____ Date _____

Name _____

Address _____

City _____

State _____ ZIP _____

Phone (_____) _____

Send toys to: 1997 BUILD-A-TOY, *WOOD* magazine, 1912 Grand Avenue, Des Moines, IA 50309-3379. **1996 BUILD-A-TOY ENTRY DEADLINE: SEPTEMBER 1, 1997**

(Attach one entry form to each toy. Copies okay)

DEWALT
SKIL
DREMEL
Milwaukee
MEISER
PORTER-CABLE

1997 Build-A-Toy Contest Prizes

Over $22,000 in tools and supplies to win!

Best Toy Entry

$3,000 in Delta tools
(Original design only, all divisions)

Junior Craftsman

(19 yrs. and younger, all designs)

Grand Prize
$1,400
RBI Hawk Ultra scrollsaw

First Prize
$1,000 in
Skil power tools

Second Prize
$750 in
Dremel tools

Third Prize
$500 in
Meisel Hardware merchandise

Home Hobbyist

(original designs only)

Grand Prize
Grizzly stationary power tools valued at $2,500

First Prize
$2,300 in Craftsman stationary machines
(19638 radial-arm saw, 29941 table-saw, 2483 bandsaw, 22580 oscillating spindle sander, 23512 12" compound miter saw)

Second Prize
$750 in
Skil tools

Third Prize
$500 in
Dremel tools

Professional

(original designs only)

Grand Prize
$2,500 in
Bosch tools

First Prize
$2,000 in
DeWalt tools

Second Prize
$1,050 Milwaukee sliding compound miter saw

Third Prize
$500 in
Porter Cable tools

Citations (All designs, all divisions eligible)

Best Use of Wood, $300 HVLP paint system from Campbell Hausfeld
Best Pull Toy, $300 in MLCS woodworking products
Best Educational Toy, $250 in Constantine's merchandise
Best Action Toy, PowerPress pipe clamp spreader and Speedbor2000 flat bits worth $170 from American Tool
Best Model, Quick-Grip bar clamp and Horsepower handy clamp worth $185 from American Tool
Best Clear Finish, $250 in Formby's finishing supplies
Best Painted, Dyed Finish, $250 in Formby's finishing supplies
Best Transportation Toy, $399 Vicmarc mini lathe from Craft Supplies USA

Special Award

Best Entry/Shop Class (no limit on number of toys per class entry): $250 in Delta tools; $1,000 in 3M supplies; Quick-Grip bar clamps, 10 Micro bar clamps, and 5 Jack PLUS hand saws worth $375 from American Tool; $250 in Klockit merchandise

1997 CONTEST RULES

1. Toys must fit into a box no larger than 2' x 2' x 2'. The primary material should be wood but may incorporate other materials.
2. Please follow Consumer Product Safety Commission guidelines: nontoxic wood finishes only; no parts smaller than 1 1/4" square on toys for children under three years of age; no sharp corners or points; pull strings longer than 12" should not have beads or other attachments that could tangle and form a loop.
3. Entries must be received by September 1, 1997. All entries must be postpaid; collect entries will be refused. Attach an entry label, photocopy of an entry label, or a 3½" x 5" card with entry information and your name and address to each toy.
4. Woodworkers (except Junior Craftsmen) who build toys from existing plans will be eligible for Citation prizes only. Woodworkers who build their own original designs will be eligible for all prizes.
5. Entry constitutes permission to use winner's name, hometown and photograph for promotional purposes, unless prohibited by law. Employees and immediate family members of Meredith Corporation and co-sponsors and their affiliates and subsidiaries are ineligible. Void in Quebec.
6. Winners will be selected and notified by mail on or about October 15, 1997, and will receive the prize directly from the manufacturer/distributor. Value of prize is suggested retail price. For a list of winners, send a separate, self-addressed stamped envelope after November 1, 1997 to BUILD-A-TOY, 1912 Grand Avenue, Des Moines, IA 50309-3379.
7. Meredith Corporation will donate all entries or auction money received from entries to the U.S. Marine Corps Reserve Toys for Tots program.
8. **For woodworkers who enter their toy as an original design:** Toy must be your own original design. A different approach to an existing toy would qualify. Toys based upon published patterns are not eligible.
9. A panel of representatives from the U.S. Marine Corps Reserve, Meredith Corporation, and woodworking experts will judge the toys on or about Sept. 15, 1997, on child's appeal, craftsmanship, originality, durability, safety, and finish. The panel's decision will be final.
10. Professional woodworkers include woodworking teachers and anyone earning an income by selling wooden items.
11. Winners are responsible for applicable taxes.

DRAWING RULES

1. NO PURCHASE OR CONTEST ENTRY NECESSARY.
2. To enter, fill out the Official Entry Form or place this information on a 3½" x 5 postcard. Up to 25 entries per person allowed. Persons who enter the contest are automatically entered, one entry per toy up to 25 toys.
3. Sweeps begins on September 1, 1996. Entries must be received by September 1, 1997. No responsibility is assumed for lost, late or misdirected entries.
4. Sweeps open to residents of the U.S.A., except employees of Meredith Corporation, contest sponsors, their agents, affiliates, subsidiaries and immediate families.
5. The winners will be selected on or about October 15, 1997. Winners will be notified by mail and prize delivered on or about October 30, 1997.
6. Selection of winners by a random drawing from all eligible entries received will be under the supervision of Meredith Corporation whose decisions are final.
7. Odds of winning depend on number of entries received.
8. Prizes are not exchangeable or transferable. Only one prize per entrant is allowed.
9. Entry constitutes permission to use winner's entry, name, hometown, likeness and photograph for editorial, public relations, promotional and advertising purposes on behalf of Meredith Corporation, unless prohibited by law. Winners will be required to sign an Affidavit of Eligibility and Release of Liability within ten (10) days of notification.
10. Subject to all federal, state and local laws and regulations. Void where prohibited. Applicable taxes are the sole responsibility of the winners.
11. For a list of prize winners (available after October 15, 1997) send a separate, self-addressed, stamped envelope to:
Build-A-Toy Sweepstakes, 1912 Grand Avenue, Des Moines, Iowa 50309-3379.
12. Prizes: 25 woodworker's packets (approximate retail value $25 each) 25 Power Press pipe clamp spreaders (approximate retail value $xx) and 150 WOOD Plans (retail value $9.95 each).

BUILD 'A-TOY®

With the Hitachi approach

CORDLESS TOOLS WORK LONGER AND WEIGH LESS

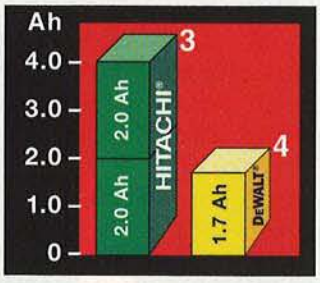
The best in cordless freedom, power and weight is only available with the unique Hitachi Battery Belt Pack. Other approaches are just a pain in the wrist. Plus, the Hitachi approach is interchangeable for all same-voltage Hitachi tools, including flashlights.

Other approaches

put all of the weight on the wrist

For example:

Compare the work-weight



Compare the power

1 The Hitachi DS13DV2B 12V Cordless Drill has a work-weight of only 3.1 lbs. using the unique Hitachi Battery Belt Pack (EB12BH).
2 The DeWalt drill, pictured above, has a work-weight of 5.6 lbs.
3 The Hitachi Battery Belt Pack supplies 4.0 Ah of power utilizing two 2.0 Ah batteries.
4 The DeWalt battery, supplied with the drill pictured above, provides only 1.7 Ah.

▪ DeWalt is a registered trademark of DeWalt Industrial Tool Company

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IT WILL AMAZE YOU.™

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POWER TOOLS

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For more information, call:
1-800-59-TOOLS
(1-800-598-6657)

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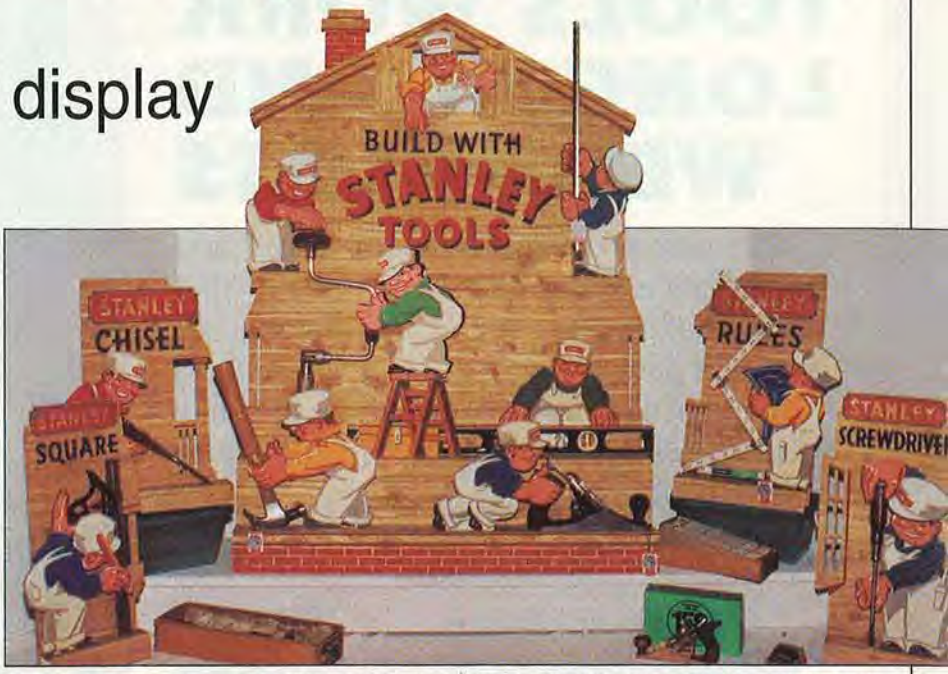
When cardboard carpenters sold tools

A one-of-a-kind Stanley window display from 1939



Happy cartoon carpenters show off their real tools in this 1939 Stanley window display. The planes in the front are new reproductions of old Stanley models, sold by collector and dealer Clarence Blanchard.

"A good tool window always gets attention," the Stanley Works counseled hardware dealers in a 1939 flyer. "This is especially true in the Spring when the building business opens with a bang; when home and camp owners are fixing up their places; when schools are requisitioning tools."

The flyer accompanied a boxful of colorful die-cut cardboard pieces depicting carpenters working around a house, and showed how to set them up in a store window. Intended for use during the last two weeks of March 1939, the display aimed at touching off that springtime burst of business.

The forgotten package

H.B. Craven of Wayne, Nebraska, was one retailer slated to receive the display. Apparently, though, Craven's cardboard cutouts weren't even shipped from the printer in Chicago until March 30.

Perhaps the spring tool-buying frenzy in Wayne already was underway when the package finally arrived, or maybe another display was in place. In any case, the carton was set aside unopened.

And so it remained until the 1970s, when a tool dealer discovered the package of props and displayed the set once. Then, for a convention of Stanley Tool Collectors in 1993 in Hartford, Connecticut, current display owner Clarence Blanchard constructed a mock storefront window and set up the display with tools from his collection. He showed it again at a Mid-West Tool Collectors Association meet in Charleston, West Virginia, the following year.

Many old-tool authorities believe this is the only complete Stanley window display in existence. "Some collectors have one or two Stanley Happy Carpenters, but not complete units," Clarence says.

Costly cardboard

And what is such a rarity worth? "Advertising is well established in antique collecting, and good samples demand high prices. Plus, Stanley point-of-sale advertising is hard to find," Clarence says.

"But this takes up considerable space," he points out, "so it wouldn't be desirable to many collectors." Clarence figures the display's value falls in the low five-figures, and he's turned down at least one offer in that range. That just shows the kind of attention a good tool window gets, even one more than half a century old.

Top ten tools for display

The eleven "happy, busy Stanley Carpenters" displayed these ten tools. Prices are 1939 retail prices.

- Stanley Bailey jack plane, no. 5, $4.40.
- Stanley combination try square and miter square, no. 21-12", $1.20.
- Stanley Atha nail hammer, no. 51½-16oz., $1.25.
- Stanley Green End Zig-Zag rule, no. 106-6 ft., 65¢.
- Stanley Everlasting chisel, no. R40-1", $1.70.
- Stanley bit brace, no. 915-10", $4.40.
- Stanley screwdriver bit no. 26-¼", chucked in brace, 20¢.
- Stanley aluminum level, no. 313-24", $3.00.
- Stanley Pull-Push rule, no. 7506N, 65¢.
- Stanley Hurwood screwdriver, no. 20-6", 50¢.

Display and tools: Clarence Blanchard, Pownal, Maine Photograph: Larry Johnston Written by Larry Johnston

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***Internet*: 74404.3516@compuserve.com**

Looking for resawing alternatives

My projects seldom use full-thickness ¾" stock, so my thickness planer is in almost constant use. As you well can imagine, I lose a lot of valuable wood to my planer in the form of shavings. Can you suggest a method of resawing without a bandsaw? My benchtop bandsaw doesn't have the guts (or the clearance) to resaw anything much wider than 3" pine.

—Jon Haverstick, Santa Ana, Calif.

Jon, you can resaw wood using a tablesaw. To do this, cut into the board on both edges, and use a handsaw to cut through the remaining wood in the center of the board (see drawing *right*). Here's one easy way to do this:

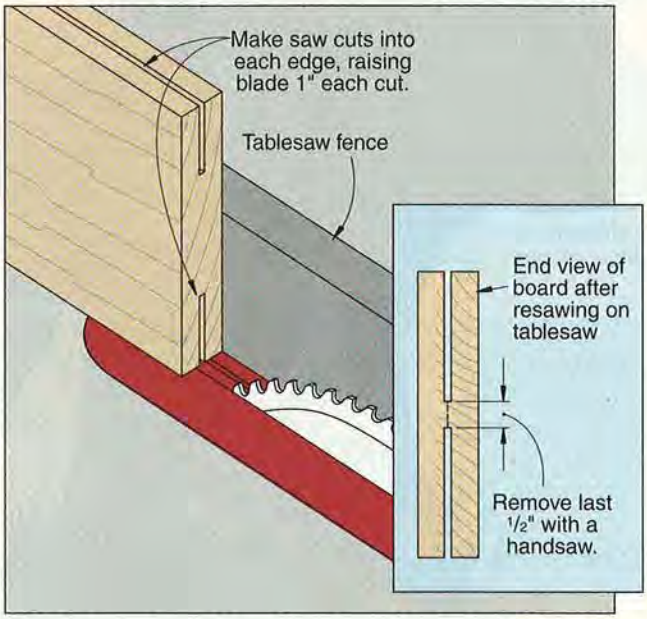
1 Set your rip fence so the space between the tablesaw blade and the rip fence equals the final thickness of the resawn boards plus 1/16". This extra thickness will allow you to plane or sand the wood to remove the saw marks.

2 Adjust the blade height to 1" or less, and make a cut into each edge of the board. Be sure to keep the same face of the board against the rip fence while you make these cuts.

3 Raise the sawblade an additional 1", and deepen the cut on each edge. Repeat this process until you have reached the height limit of your sawblade, or you have a ½" "web" of wood separating the two cuts in the center of the board.

It's important that you leave at least a ½" web of unsawn wood in the middle of each board. With less material remaining to be cut, the board becomes too unstable to safely cut on the tablesaw.

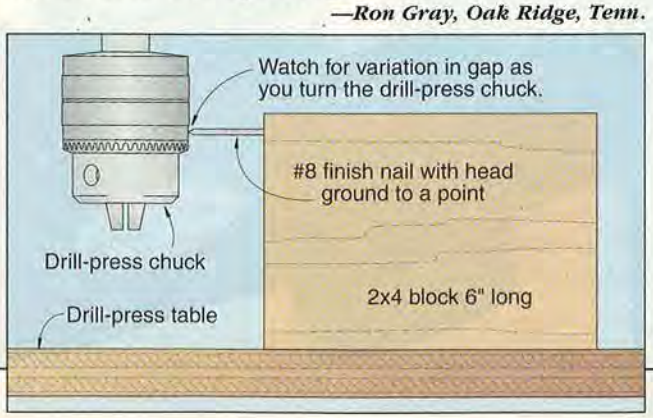
4 Separate the sections by cutting through the ½"-thick area of wood in the center of the board with a handsaw. Place the board to be resawn upright in a vise, with about two-thirds of the board above the vise. Use the handsaw to cut the center web down to just above the vise. Then, reverse the board, placing a spacer between the cut halves. Reposition the board in the vise, and saw through the remaining center web.


Make saw cuts into each edge, raising blade 1" each cut.
Tablesaw fence
End view of board after resawing on tablesaw
Remove last ½" with a handsaw.

Rosette cutters need the right power tool

I recently purchased a rosette cutter for my drill press, but to date have been unsuccessful using the tool. I can get the cut started okay, but then the wood tears as I apply more pressure, and the cutter chatters and damages the pattern.

—Ron Gray, Oak Ridge, Tenn.


Watch for variation in gap as you turn the drill-press chuck.
#8 finish nail with head ground to a point
Drill-press chuck
2x4 block 6" long
Drill-press table

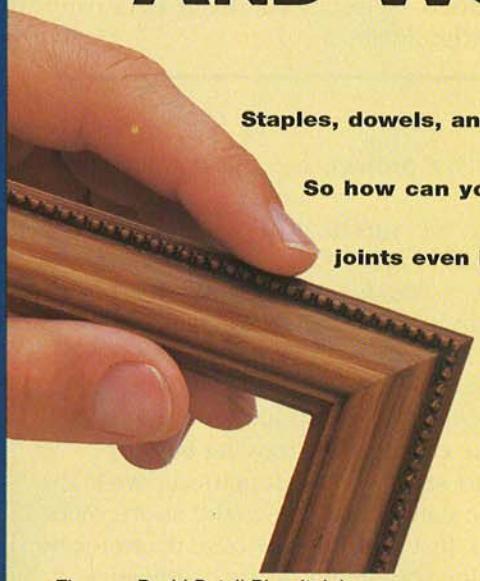
Ron, you're encountering a problem common to many woodworkers who try to use a rosette cutter on too small a drill press, or on a drill press with excessive spindle runout. These cutters, with their multiple shaping blades, exert tremendous drag while cutting. That drag causes smaller drill spindles to flex and then jump, tearing at the wood. And the deeper you make the cut, the more you'll experience this problem.

We suggest that you use a large drill press with a thicker spindle to resolve your problem. If you already have a floor-model drill press, you can check the spindle runout with a dial indicator, or use the homemade gauge shown in the drawing *left*. Contact your tool dealer on how to reduce the runout of the drill-press spindle.

Continued on page 24

THE NEW RYOBI DETAIL BISCUIT JOINER

THE DIFFERENCE BETWEEN WOODWORKING AND WOODNOTWORKING.

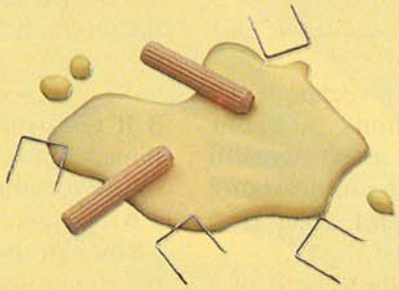


The new Ryobi Detail Biscuit Joiner uses miniature "Accu-biscuits" for neat, tight, professional joints.

Staples, dowels, and glue won't do. Standard-size biscuits won't fit.

So how can you make neat, tight, professional joints even in small stock? With Ryobi's new Detail Biscuit Joiner, that's how.

Standard biscuits stick out of small joints, and the mis-match shows, even after you trim the excess.



This compact powerhouse cuts smaller slots and uses miniature "Accu-biscuits™" to fit where standard biscuits don't. And its price is as small as its biscuits. But the Detail Biscuit Joiner is big on performance, from its beefy motor to its die-cast base and see-through fence. So see the new Ryobi Detail Biscuit Joiner at your local home center. It'll get your wood working like never before.

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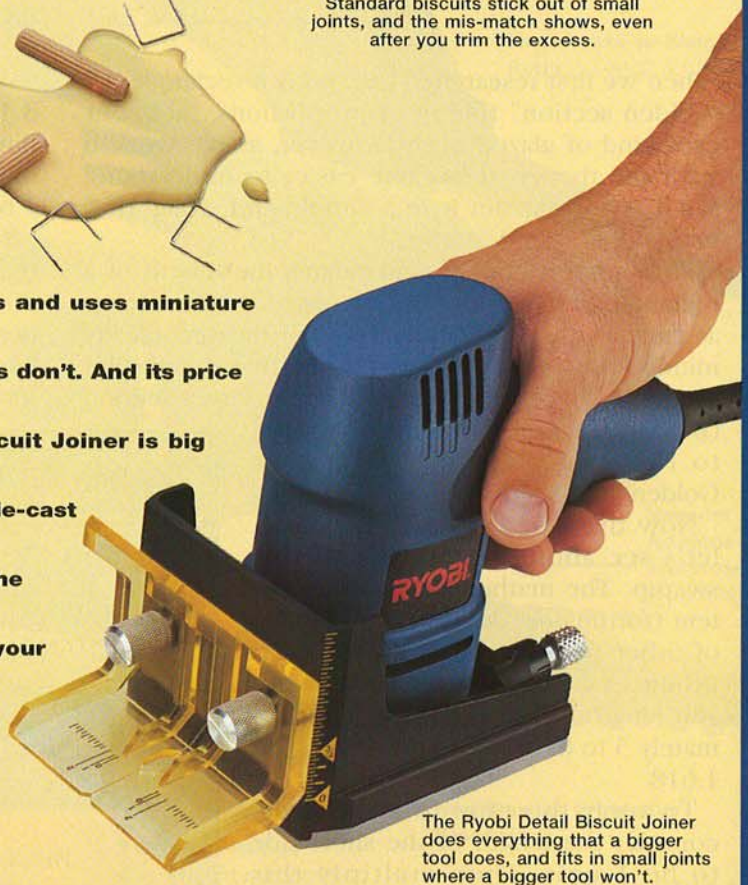

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Continued from page 22

Ye olde sawdust filler

I get fine sawdust from my scrollsaw, and I would like to use it as part of a wood filler. What can I mix with this sawdust that will take a stain and won't turn white when varnished?

—Earnest Lemcke, Sioux Falls, S.D.

Ernie, you can mix the sawdust with yellow woodworker's glue to make a filler for small holes. Keep the sawdust content of this mixture high, and it will take stains and not turn white when varnished.

To make this filler, first apply some yellow woodworker's glue to the area to be filled. Then, add the sawdust, working it into the glue with your finger. While the glue is still damp, sand the area, working more sawdust into the glue. Repeat this process as many times as necessary to fill the defect in the wood. Thoroughly sand the filled area to remove any glue residue around the patch, preventing the dreaded "white spot" from occurring when you apply the finish.

Golden proportions

I have heard of the "golden rectangle" theory that's used to calculate the proportions of furniture parts. However, I have not heard it explained so I can understand it. Can you give me a simple explanation? How can I apply it to my candlestick designs so that the various parts are in proportion to each other?

—Jack Fildes, Grafton, Ohio

When we first researched the "golden rectangle" or "golden section" theory of proportions, Jack, our eyes kind of glazed over. However, as we worked with the theory, it became easier to understand. We'll try to explain it in a simple and straightforward way.

This proportional system relates the length of a rectangle to its width, and was used by the Greeks as early as the 4th century B.C. For our technically minded readers, this system states that the smaller section of a line (AB) is related to the larger section (BC), as the larger section is related to the whole (AC). (Whew! see Golden Section drawing *right*.)

Now that we've got you confused, let's see about getting out of this swamp. The mathematics of this system (fortunately done by a whole lot of other people over the centuries) produces a ratio between the width and length of a rectangle of approximately 5 to 8, or, more precisely, 1 to 1.618.

To apply this ratio to a rectangle, consider the length of the short side to be 1 unit. Then multiply this length by 1.618 to get the length of the long side. For a rectangular solid (for example, a box or chest) obtain the third dimension by adding the lengths of the rectangle sides (1x + 1.618x) as shown in the drawing *right*.

When designing a project, use these calculations in this way:

1 Determine one measurement of your candlestick (either the overall height of the candlestick or the width of the base). For our example, we'll arbitrarily choose a height of 6".

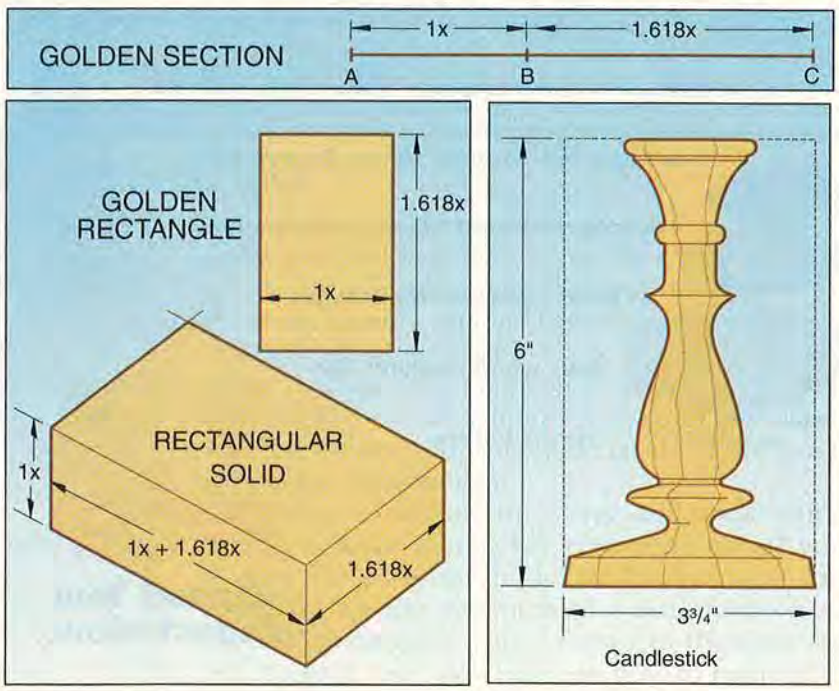
2 To find the diameter of the candlestick base, divide the height (6") by 1.618:

6" ÷ 1.618 = about 3¾"

(see the candlestick drawing *below*)

3 If you want to start your calculations with the dimension of the candlestick base (the shorter side of the rectangle), just multiply the base diameter by 1.618 to determine the height of the candlestick.

You can use this proportional system to calculate the dimensions of any project where you know one dimension. For example, a 16"-high coffee table designed using the golden rectangular solid would have a top width of 16" × 1.618, or approximately 25¾", and a top length of 16" + 25¾", or 41¾".



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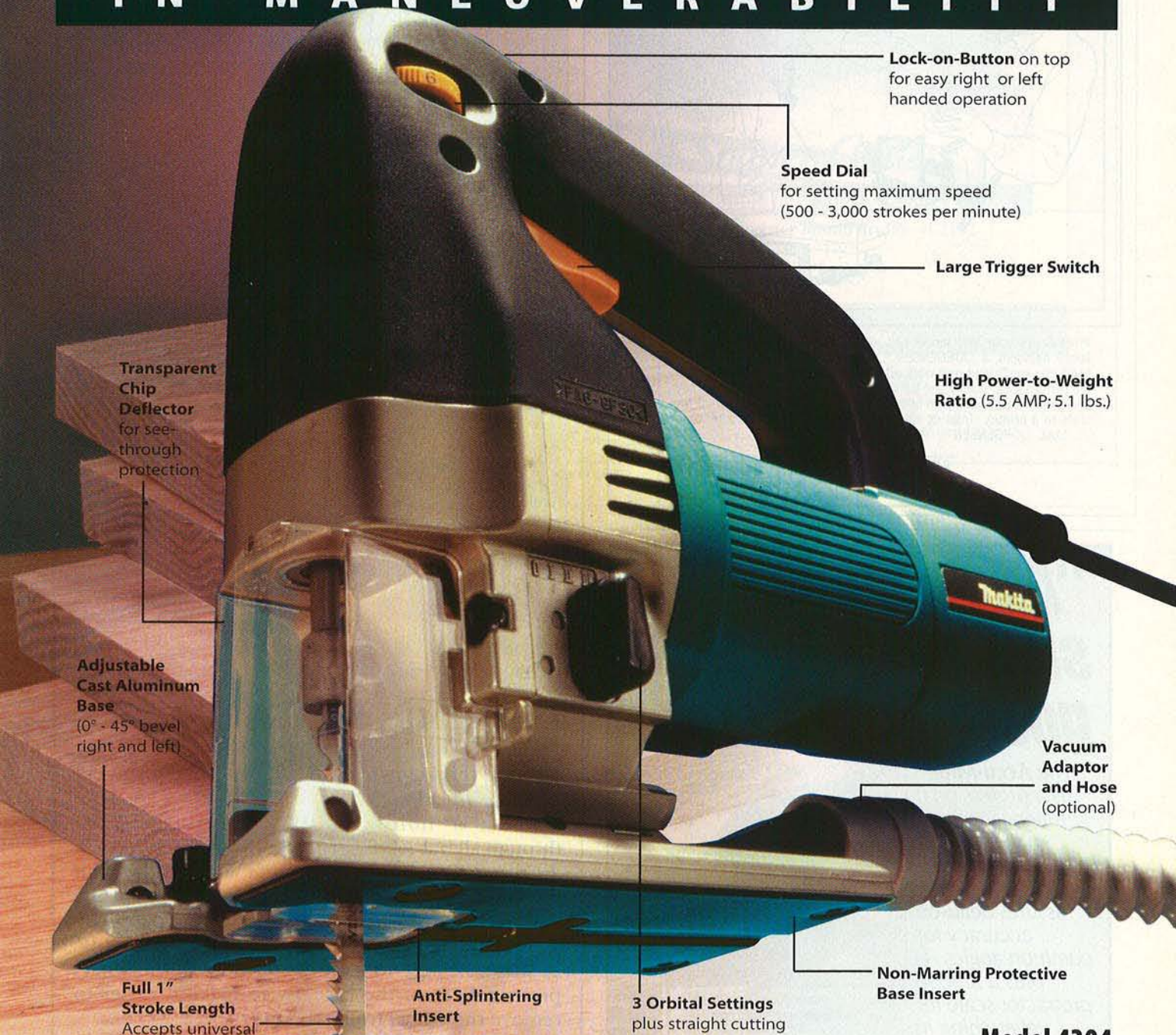

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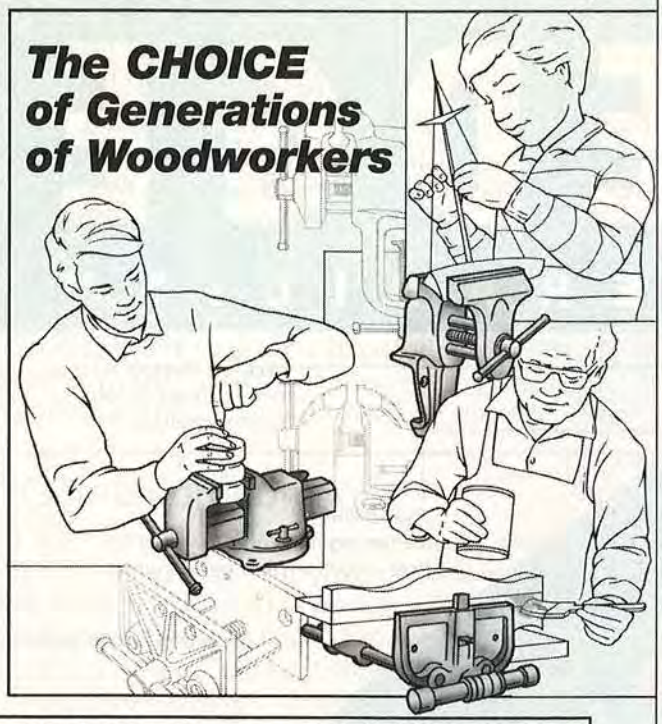

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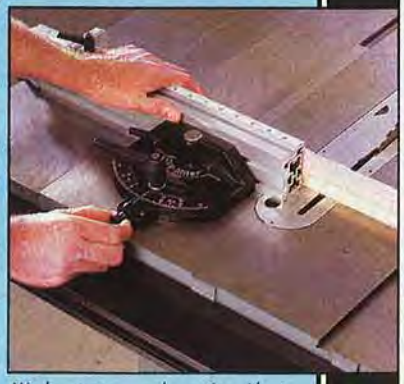

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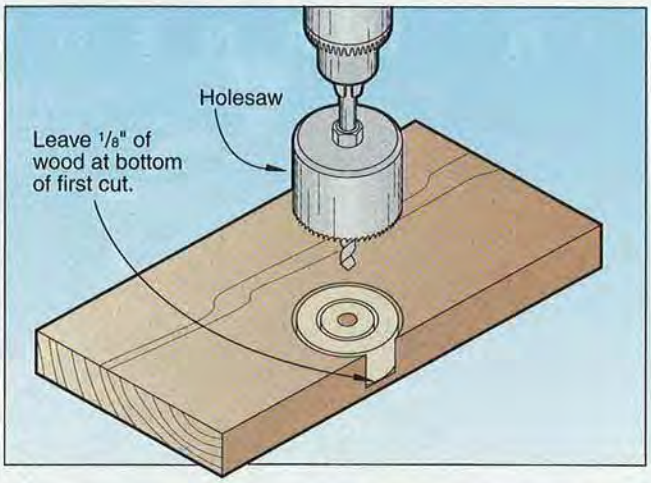
ASK WOOD

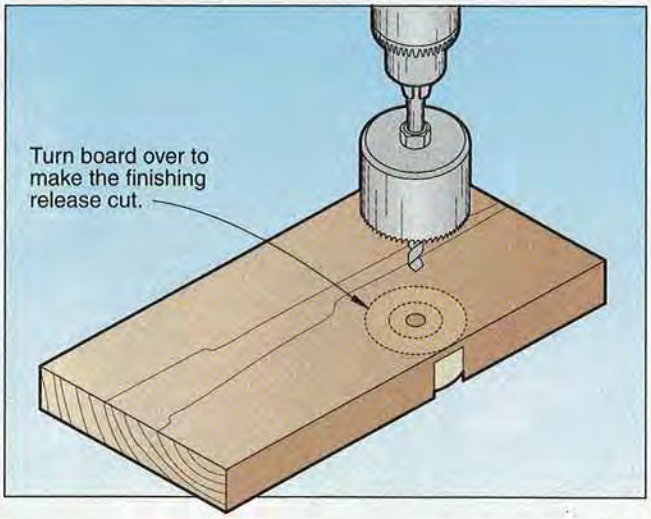
Continued from page 24

Wholesale holesaw tire making

I am looking for a way of making tires for spoked wheels on my toys. I need an inside diameter of 7/8" and an outside diameter of 1 3/8". Can you help?

—Merwin G. Willman, Schertz, Texas





Merwin, the following procedure will help you cut accurate wheel tires:

1 Use a 7/8" holesaw with a pilot bit and cut through all but 1/8" of the thickness of the wood.

2 Change to a 1½" holesaw, and aligning the pilot bit to the pilot hole, cut through all but 1/8" of the wood. Flip the board over, and using the pilot hole as a centering guide, cut through the remaining 1/8" of stock. Be sure to leave ½" or more of the wheel protruding from the holesaw to make it easier to remove the wheel from the saw.

3 Sand the outside of the wheel. You can also turn it on a lathe equipped with a screw center, or an arbor on a drill press.

4 Take the turned and sanded wheels back to the drill press. Use the 7/8" holesaw, and working from the back, cut through the remaining 1/8" of thickness in the center of the wheel.

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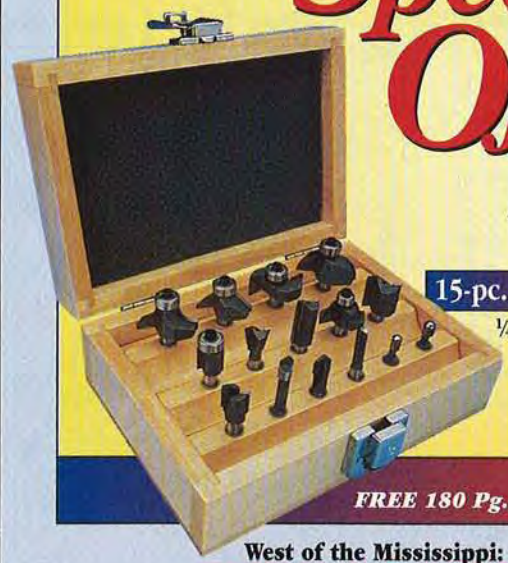

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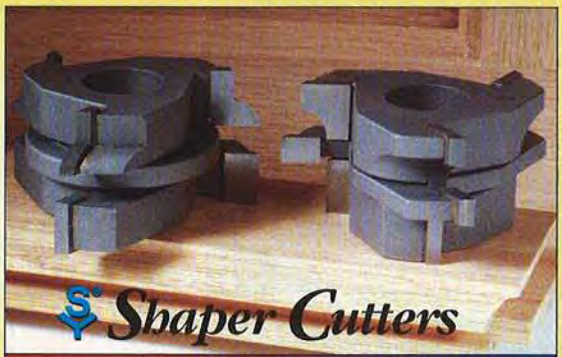

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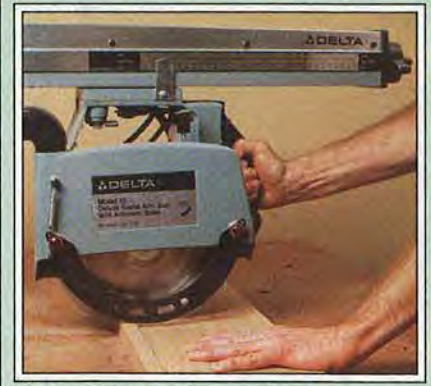

A hand will work as a hold-down. But our shop tip of the month *right* shows you a better and safer way.

If you own a radial-arm saw, you know that holding the workpiece securely to the saw table can prove difficult to do. But one alert reader, Dave Yarkosky, has come up with a terrific solution. We think his tip is so useful that we awarded him the top-tip tool prize.

If, like Dave, you've come up with ways to improve the tools in your shop, or if you've invented any useful jigs or techniques, we want to know about it. We'll pay you $40 if we select your tip for publication, and you'll be eligible to win a tool prize for the best tip of the issue. To be considered, send a letter with a photo or drawing of the tip to:

Tips From Your Shop
(and Ours)
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Our goal is to publish only new and original shop tips, so please send your idea to just one magazine. Also note that we cannot return your submissions. Thanks, and keep those shop tips coming.

Kerry Gibson

GENERAL-INTEREST EDITOR

Hold-down steadies workpieces on saw table

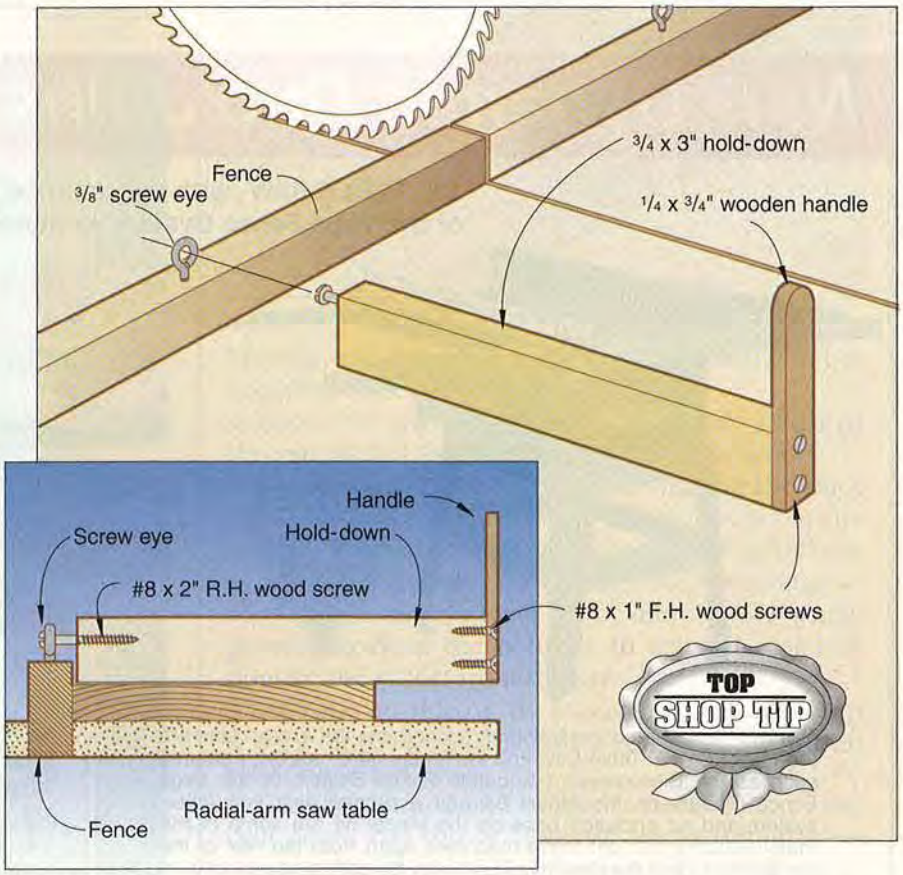
Feather boards and hold-downs are easy to find for tablesaws and router tables. Now, here's one you can build for your radial-arm saw. It makes your operations safer, and stops the subtle creep or movement of the stock that occasionally ruins cuts.

To build this helper, attach two screw eyes to your saw's fence about 8" to the right and left of the blade. Then, fashion the hold-down out of ¾×3" stock, and fasten a handle as shown *below*. The length of the hold-down should equal the width from the fence to the front edge of the saw table.

Position a roundhead screw in the end of the hold-down so that the hold-down sits flush with the most common thickness of stock you normally cut. For thicker or thinner stock, make another hold-down, and position the screw accordingly. Make sure your fence is securely anchored so it doesn't pull up when you push down on the hold-down.

—Dave Yarkosky, Albia, Iowa

For submitting the best tip in this issue, Dave Yarkosky receives a Delta Sidekick 10" Sliding Compound Mitersaw.



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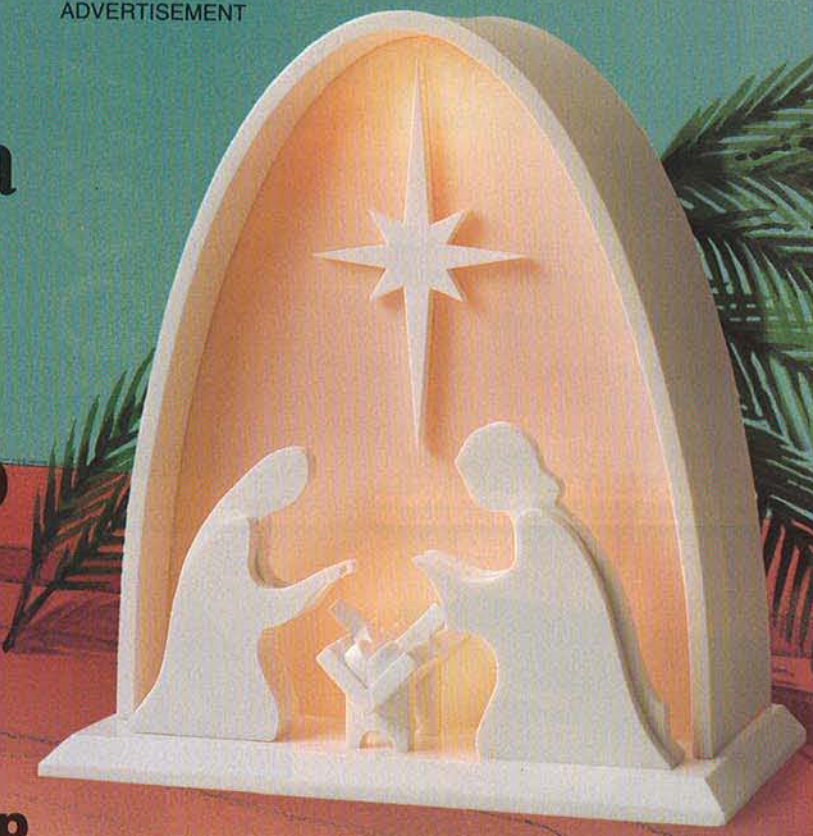

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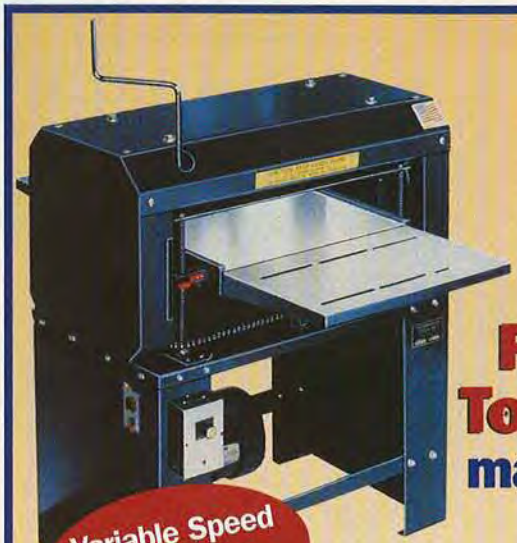

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TIPS FROM YOUR SHOP (AND OURS)

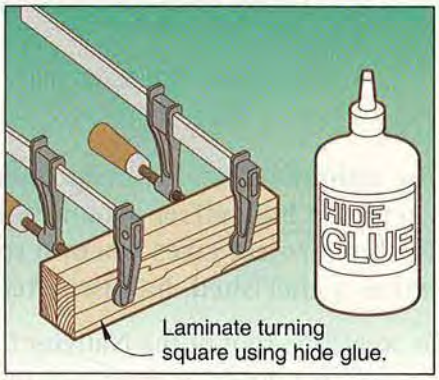
Continued from page 28

Hide glue helps you with pry-apart turnings

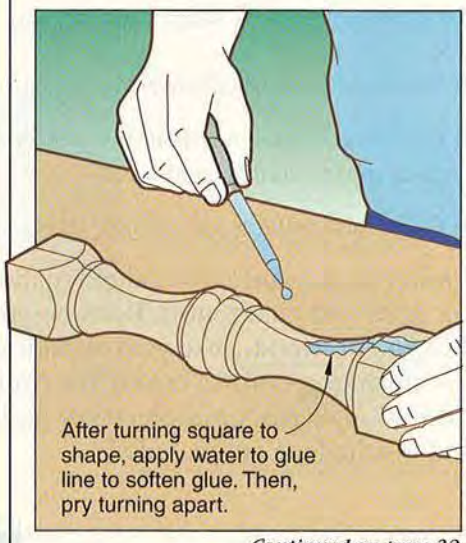
To make two half-round turnings, most woodworkers glue the stock together with thick paper between the stock pieces and pop apart the paper-to-wood joint after turning. But this procedure can ruin small or delicate turnings because of the force needed to pry apart the pieces.

To prevent this problem, glue your stock together with bottled hide glue. When you finish turning the piece, place a few drops of water along the glue line on both sides and wait 5-10 minutes. Since hide glue is hydrophilic, or "water-loving," it will pull the moisture into the glue joint, soften, and lose much of its bonding strength. This allows you to pry the two half-round pieces apart easily with a putty knife.

—Carl Davis, Owens Cross Roads, Ala.



Laminate turning square using hide glue.



After turning square to shape, apply water to glue line to soften glue. Then, pry turning apart.

Continued on page 32

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843	*New* #447 Saw w/blade on left side	$144.
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1264	DW682K	Biscuit Joiner Kit	$219.
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Circle No. 93

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Circle No. 1312

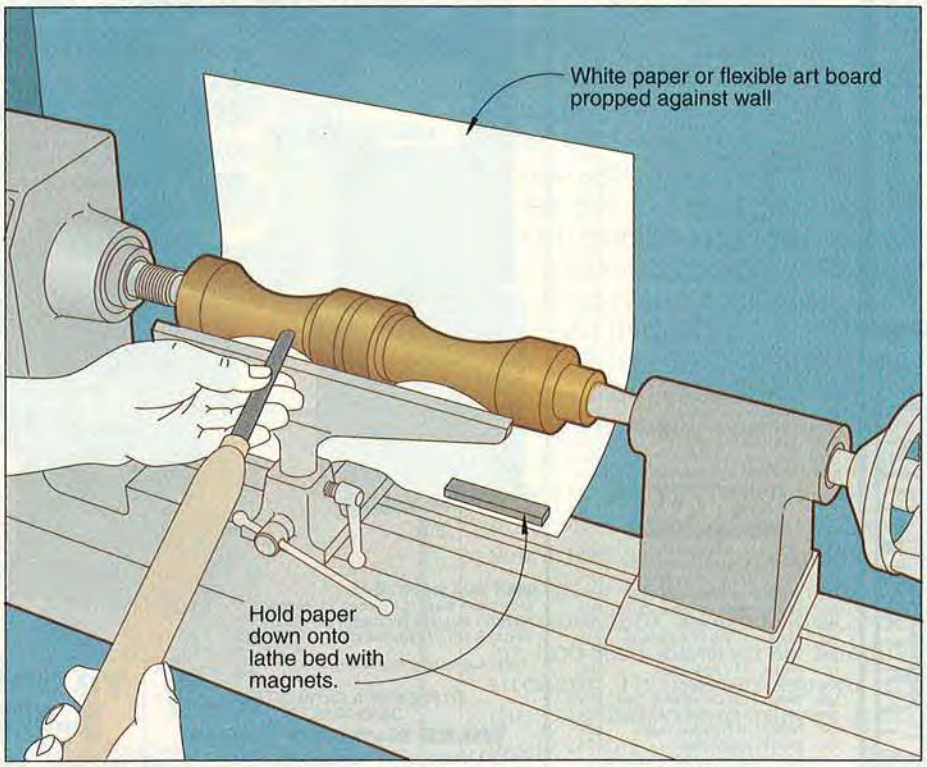
Continued from page 30

White backdrop helps turnings stand out

Some home shops are not the clean, well-lit places they could be. And on projects with intricate shapes, like the profile of a turning, a clear view of the workpiece may ultimately make the difference between success or failure.

If the area behind your lathe is dark and dingy, you can improve the view of your turnings by placing a piece of white paper or flexible art board behind the workpiece. Hold the bottom of the paper to the lathe with a pair of magnets as shown in the drawing, and prop the top against the wall. The contrast between the white paper and the wood will give you a crisp silhouette for clearly judging the progress of your work.

—Michael Locke,
Huntington Beach, Calif.



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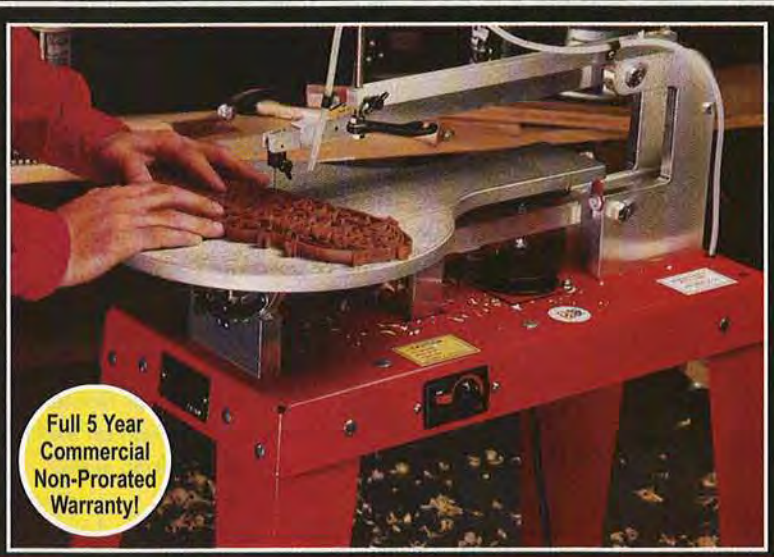

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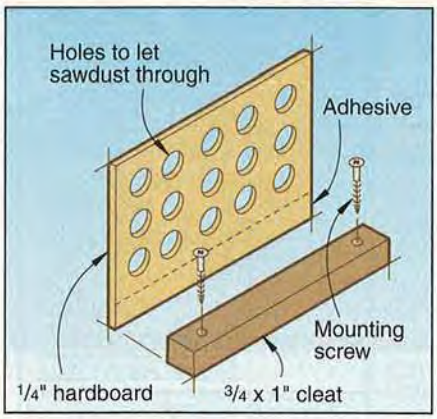
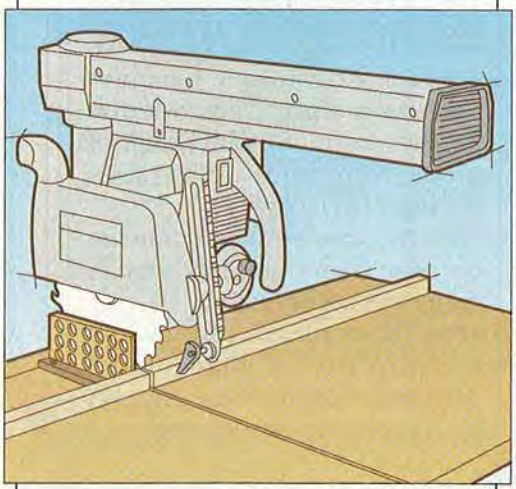
Behind-the-fence guard adds a margin of safety

The blade on a radial-arm saw often spins for several seconds after you return the saw carriage behind the fence. A careless or impatient reach behind the fence could prove dangerous.

A simple guard, such as the one shown *below*, will keep your fingers away from the blade. It also prevents cut-off scraps, blade wrenches, and try squares (which don't belong behind the fence anyway) from interfering with the spinning blade. Size the ¼" plywood or hardboard guard to fit your particular saw. Bore a liberal number of ¾" holes in it to allow sawdust to escape. Glue a mounting cleat to the bottom edge on one side. Affix the guard with screws, or in some other way that allows easy removal.

—Cecil Lau, Burnaby, B.C.





Continued on page 34

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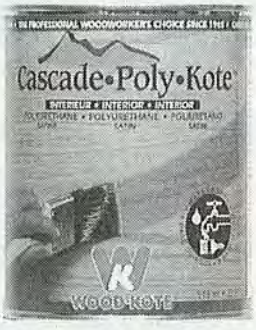
Q: I have an antique chair I'd like to refinish. Can I use a "water based" polyurethane? Will it provide a durable finish?

Steve Clements, Irvine, CA



A: After you have stripped, sanded and re-stained your chair, you have a variety of clear finishes from which to choose. Generally, polyurethane will be more durable than lacquer or shellac. Among the polyurethanes, you can choose a traditional high solids solvent borne product that offers perhaps the most durable finish but tends to yellow with age. A water borne product, such as **Cascade•Poly•Kote™**, is often preferred for the following reasons:

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TIPS FROM YOUR SHOP (AND OURS)

Continued from page 32

For softer bristles, clean them with dish detergent

It seems like even the most careful cleaning of a paintbrush in solvent still results in a stiff, hard-to-use brush after it dries. To keep your brushes as soft and springy as they were when new, try this:

First, clean your brush in mineral spirits or the appropriate solvent. Then, wash the brush thoroughly with warm water and dishwashing detergent. The water and detergent remove minute traces of finish and solvent that otherwise will dry on the bristles and cause them to stiffen.

—Jeff Isom, Waterloo, Neb.

A FEW MORE TIPS FROM OUR WOODWORKING PROS

- Master woodturner Johannes Michelson shares the expertise he uses to tranform a chunk of green wood into a wearable, Western hat, *page 39*.
- See the Corner Detail drawing on *page 65* for a clever way to conceal a corner joint.
- Put those pieces of plywood scrap to use by edge-joining them into panels. See *page 65* for details on this simple and economical technique.

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- 120 grit

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Circle No. 46

Project Showcase

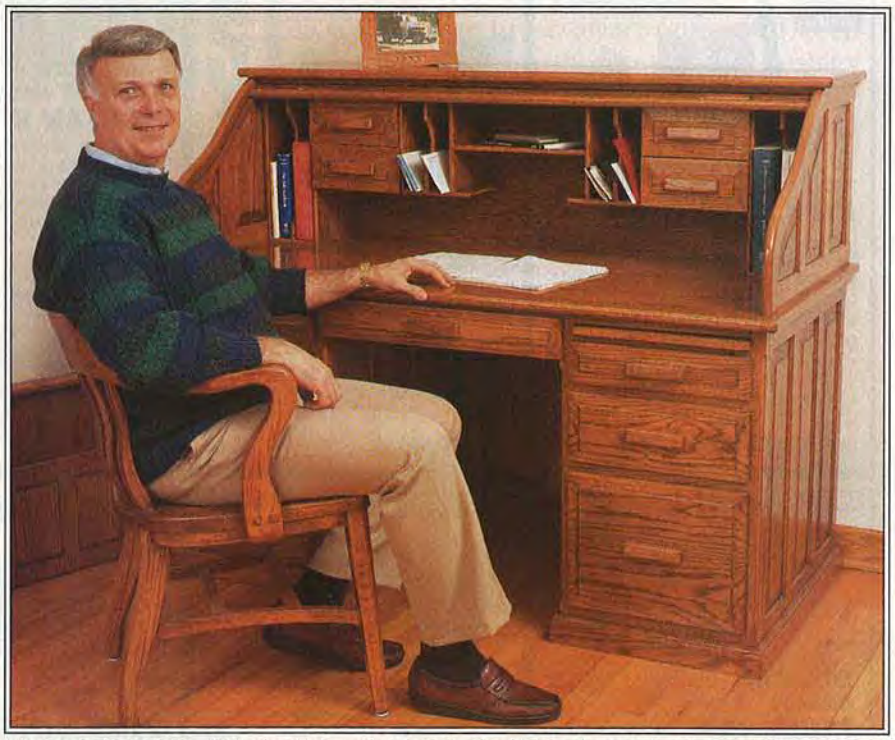
We'll feature your best work

If you've been a *WOOD*® magazine reader for a while, you might recall Project Showcase. This feature, highlighting reader-designed and -built projects, appeared periodically throughout our first few dozen issues.

Now, we're bringing it back. A couple of times per year, we'll select a few of the best project photos submitted by readers and publish them along with a little information about the project and the builder.

We'll start by showing you some items built by *WOOD* magazine staff members. On the *next page*, find out how you might get yours shown next time.

Note: *We cannot provide plans, drawings, patterns, measurements, bills of materials, additional photographs or descriptions, construction details or instructions for projects shown. Nor can we pass out addresses or telephone numbers of Project Showcase exhibitors.*



▲ **Project builder Chuck Hedlund doesn't shy away from big-time projects in his free time. He spent 268 hours designing and building this oak rolltop desk. Matching accessories round out Chuck's home office.**

◀ **Senior how-to editor Marlen Kemmet styled his mahogany dining table and chairs after the early 20th-century furniture of Greene and Greene, noted southern California architects and designers. The plugs are simulated ebony.**

◀ **Correspondence writer Don Mostrom loves to build folk-style stringed instruments. This octave mandolin is his latest design. Despite the fancy inlay work (he used Corian), this one's only his prototype.**

▲ **Art director Lee Gatzke built this chess set for his son Mike. Drawers in the cocobolo box hold the turned cocobolo and spalted maple chess pieces. The light squares on the board are highly figured maple.**

▼ **Associate art director Perry McFarlin constructed this wall-hung oak shelf for his wife's collection of antique tin cups. He designed the display shelf around oak dentil molding he bought at a local home center.**

Want to show your stuff?

You can send photos of practically anything you've built (no decks or other home improvements, please), with just one limitation: It must be an original design.

Items built from kits or directly from published plans are ineligible. Carvings must be original pieces, not taken from pattern books, roughouts, or carved in a class.

You may enter a project you built that's inspired by a plan, kit, or something you saw, but please tell us. Generally, minor changes to a published plan, such as using different wood than specified or altering a few dimensions, won't be enough to warrant selection.

Here are some factors we'll consider in making selections:

- Eye appeal. A graceful, well-proportioned design is certain to catch our eye, as will a clever or unusual one. Interesting details or exciting use of wood also will likely grab our attention.
- Craftsmanship. We'll look for evidence of careful construction. Grain matching, the way parts fit together, and quality of the finish will be just some of the things we'll watch for.
- Originality. Is there something that distinguishes your blanket chest (or whatever) from hundreds of others? Tell and show us how it departs from the commonplace.

Here's how to enter

- Send sharp, properly exposed color photographs of the item. Include an overall view plus any detail views necessary.
- We prefer slides, but can use sharp, glossy prints. (We may need to borrow the negatives for publication.) We cannot use Polaroid photos. Photos cannot be returned.
- Avoid cluttered or confusing photo backgrounds. Include a prop or two to indicate scale. (For instance, coins next to a small turning help viewers visualize its size.)
- Even if it seems painfully obvious to you, explain what the project is or what it does—we don't want to call your lamp table a plant stand.
- Describe unusual features, special construction techniques, approximate building time, wood and finish used, overall dimensions, and anything else of interest.
- Tell us a little about yourself, too. Let us know how old you are, your occupation (or former one, if you're retired), how long you've been a woodworker, and so forth.
- Include your daytime telephone number in case we want to know even more.

- Then send everything to:

WOOD magazine
Project Showcase
1912 Grand Ave.
Des Moines, IA
50309-3379

▶ **Design editor Jim Downing crafted this intarsia-style family tree for his parents on their 50th anniversary. Pieces cut and shaped from walnut, maple, cardinal wood, and osage orange are inlaid into the mahogany background.**

Photographs: Wm. Hopkins; Hetherington Photography

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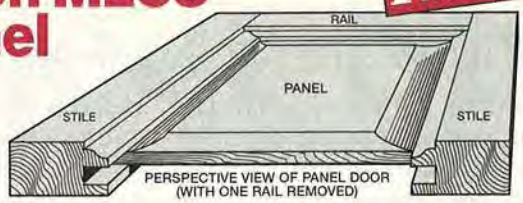

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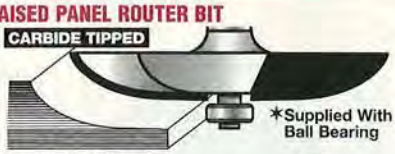

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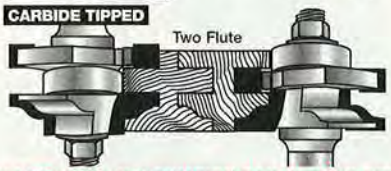

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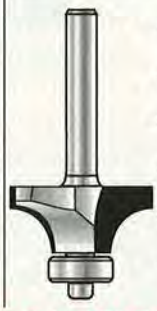

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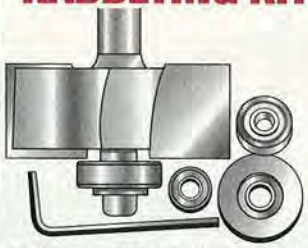

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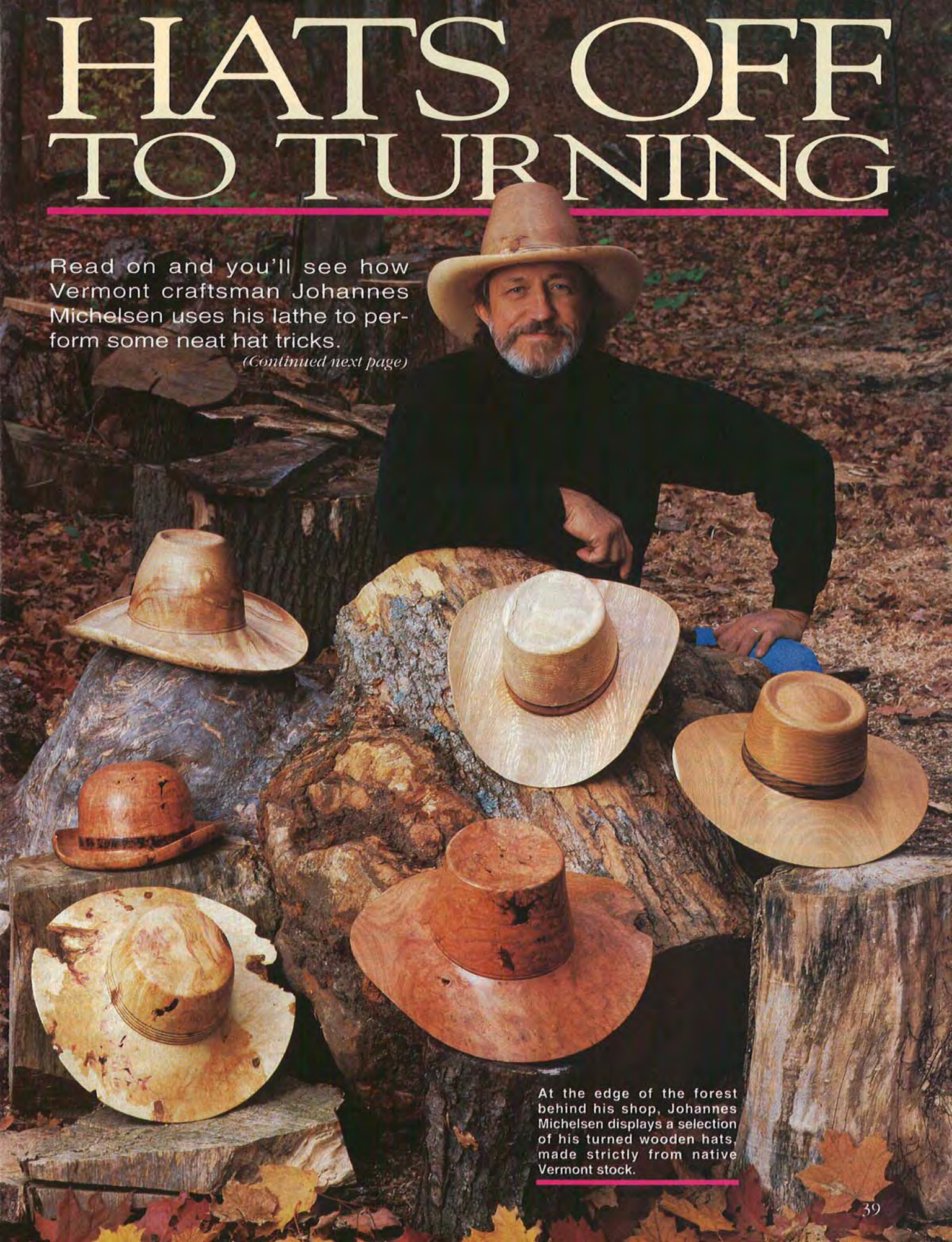
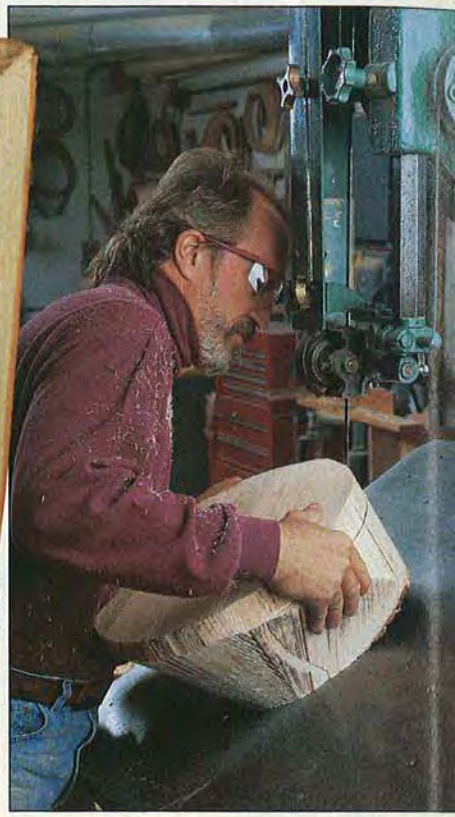
HATS OFF TO TURNING

Read on and you'll see how Vermont craftsman Johannes Michelsen uses his lathe to perform some neat hat tricks.

(Continued next page)



At the edge of the forest behind his shop, Johannes Michelsen displays a selection of his turned wooden hats, made strictly from native Vermont stock.



Above: **A wooden hat begins as a split chunk of wood, its brim laid out to the pith so that after turning, it will bend toward the bark side.**

Above right: **To rough-shape the wood, Johannes manhandles it through the bandsaw with the table tilted to 35°. Then, he'll run the hat blank through his 12" jointer to get the top and bottom parallel for mounting on the lathe.**

Some things you just have to see to believe. Such as wooden hats. Even *The World Book* encyclopedia fails to mention hats of wood, although in two pages it traces hat history back to 3100 B.C. Throughout the centuries, there were bonnets, berets, cloches, fezzes, sombreros, tricornes, turbans, and many others. But they were all made of something besides wood.

Certainly, when Zadoc Benedict founded the first hat factory in the United States in 1780 in Danbury, Connecticut, he didn't start out fitting chunks of wood to people's heads. Zadoc might have considered it, though, if woodturner Johannes Michelsen had been around back then.

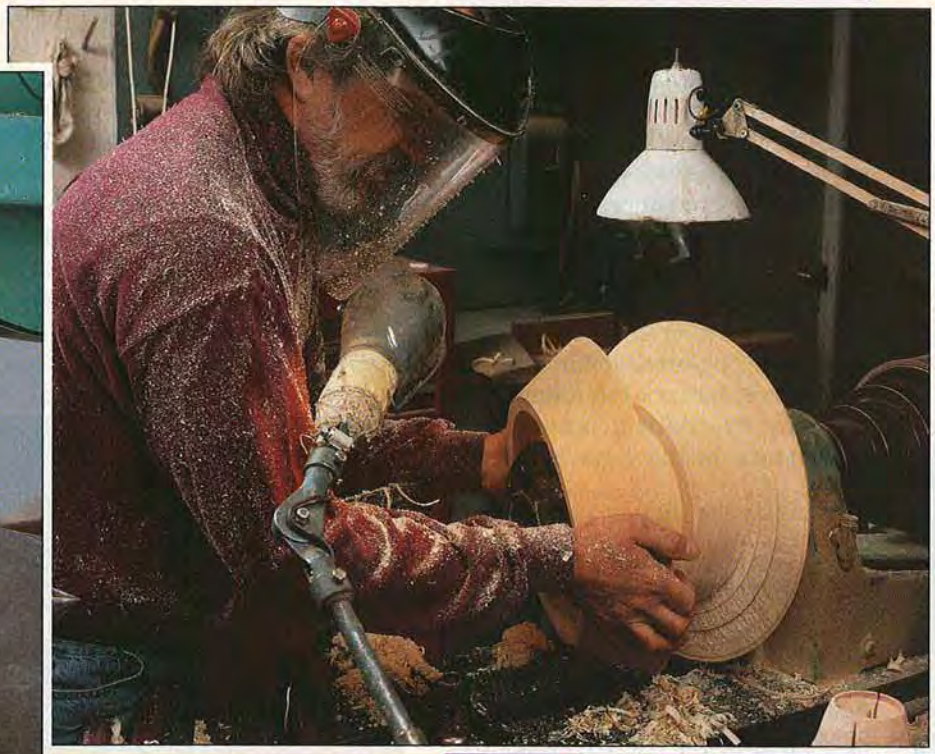
With his Manchester, Vermont, workshop separated from Zadoc's original hat factory by only 100 miles or so, Johannes no doubt would have been an influence. He couldn't have avoided it. After all, a wooden hat once seen can't help but be remembered. And to 50-year-old Johannes, turner of wooden hats, that's always good for business.

From staircases to Stetsons

Johannes was born in Denmark and raised in Connecticut. After his return from service in Vietnam in 1969, he gradually established himself as a homebuilder and land developer in the Manchester area. By 1980, however, the local economy was slowing, and Johannes began specializing in custom stair building, which he occasionally still does. Yet, he wanted to create something else with wood, something more personally expressive than staircases.

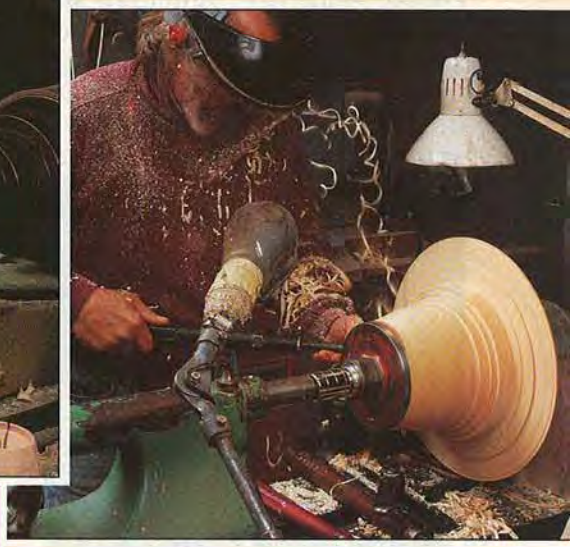
"I read a magazine article about David Ellsworth, and how he turned hollow vessels," Johannes remembers. "It showed his finished work and what they sold for. I thought, 'Wow! He gets $400 to $600 for them. I could become a bowlturner and actually make a living at those prices.' I started looking through the newspaper for a used lathe."

Eventually, Johannes located one and began to turn green wood into bowls. It wasn't all that new to him. "I had done some turning in my father's shop when I was a kid. I think he bought the lathe just to keep me and my brother away from the radial-arm saw," chuckles Johannes. "But turning green wood was all different. Then I read a book by Bruce Hoadley. He explained how green wood distorts as it dries, and saw



Left: **After rounding down the blank with a 1" gouge, Johannes uses a parting tool to part off from the hat crown a round rim of wood that will become a mirror frame.**

Below: **For a smooth, ridgeless surface on the hat, the woodturner lays the cutting edge of his gouge over on its side for a shearing cut.**



it as a handicap. But the more bowls I did, I began to look at distortion as maybe something good."

Working with distortion in the green wood became a challenge that continued through Johannes' 10 years of bowl turning. During that time, he got better and better, eventually selling his work at large craft fairs and to galleries across the nation. "After a while, I started turning vases because I liked to do big things," he recalls. "In fact, I made one pair of vases that stood 6' tall. They sold for thousands of dollars, when they sold. But it's like the real estate market—the higher the price, the fewer buyers there are. And the economy just happened to tighten up. By 1990, I had pretty much quit doing shows and had gone back to building staircases when the idea for the hats came along."

"It just popped into my head—why not turn a hat?"

A brim on a whim

"It just popped into my head—why not turn a hat? And I told Wendy, my wife, 'One of these days I'm going to turn one,'" recalls Johannes as he leans back against the lathe bed. "The hat thing was always a joke."

Hats of wood may have been a joke back when Johannes turned nothing but bowls. Today—some 600 wooden hats later—they're not funny anymore. At $550 to $1,200 apiece for wearable ones, and $180 for small hats, shown *next page*, they're serious business. Johannes' first hat was even a prizewinner, of sorts. "In the fall of 1990, woodturner Albert Lecoff [founder and director of the World Turning Center in Philadelphia] invited us to his wedding," says Johannes. "It was going to be a country-western affair, so I decided to turn that wooden hat I'd been thinking about for years, and wear it."

The hat was a hit. In a vote taken by the guests for best items of apparel, Johannes' wooden cowboy hat was the hands-down favorite. "And the hat was ridiculous, not anything like I'm doing now," says the turner. "It was unanimous—people were stomping on the floor, beating on the walls, to give me the prize. That was the only wooden hat maybe in the world at the time, and to them it was pretty special. As I look back, Albert Lecoff wasn't the inspiration for the hats, but he certainly was the catalyst."

And with the hats, Johannes' knowledge of turning green wood—with its inherent distortion in drying—began to pay dividends. "The hats allowed me to take advantage of the way green wood

Continued

shrinks," he says. "And for them, I need all the shrinkage I can get."

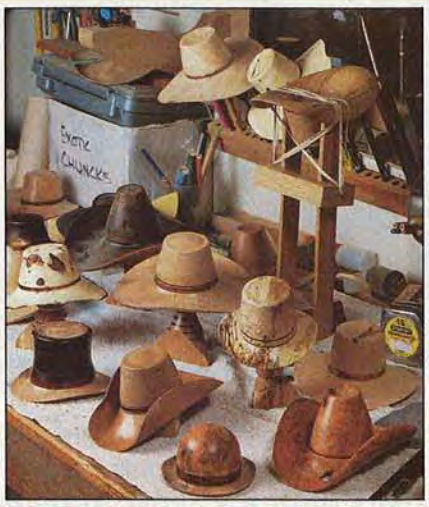
Hats from the home front

For his hats, Johannes relies on local woods from the surrounding Green Mountains—yellow birch, sugar maple, red maple, black cherry, white oak, butternut, and some boxelder. "It's all available around here. I don't have to go more than 20 miles away to get it," he says.

The height and shape of the wooden hats' crowns matter little in planning. But, their brim diameter can't exceed the 16" swing of Johannes' lathe. "The biggest hat, my Trail Boss model, takes the full swing," the craftsman notes.

While the type of hat and its brim determine how large a chunk of wood goes on the lathe, sizing a hat gets a bit more complicated. "A wooden hat has got to fit," emphasizes Johannes as he taps the burled red maple Trail Boss on his head. "I can wear this hat out in the wind. But mostly, we try for an acceptable fit."

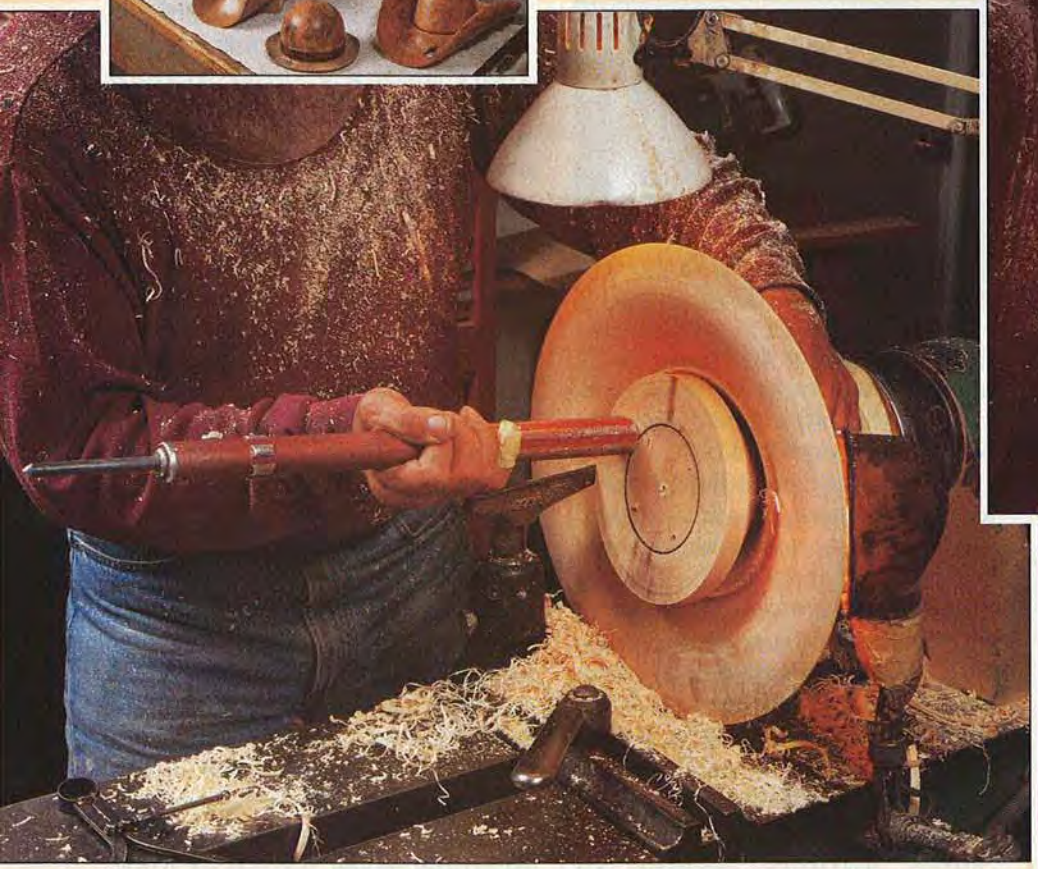
For a custom hat, that "acceptable fit" comes from accurate measurements. "When I take an order for a custom-fit hat, I measure around the head with a flexible rule, or send the customer one with instructions," the turner explains. "Because heads are oval, I get the width and the length. Then I add ⅛" for wall thickness

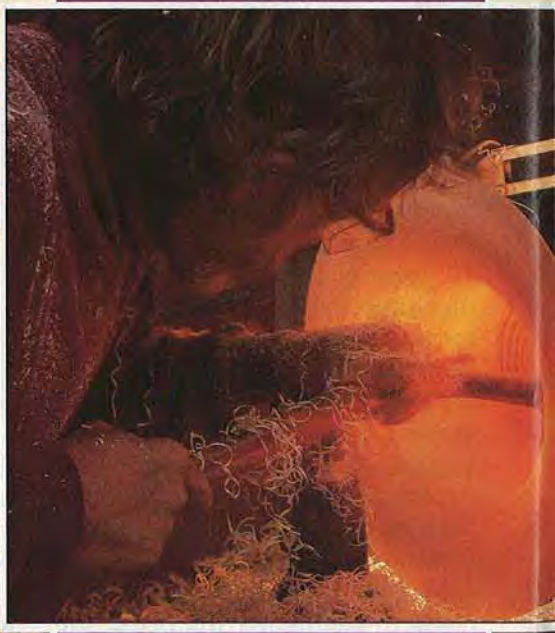


Left: **Johannes' line of smaller hats duplicates the range of styles found in his full-sized ones, but also includes top hats and suburban "crushers."**

Below: **A tap with the gouge handle and the parted-off center of the crown pops out. The piece will become a small hat. For his turnings, Johannes prefers gouges with extruded aluminum handles filled with lead shot. (HiTec tools by Glaser Engineering Company, 310/823-7128.)**

"With enough experience, you don't need science."





Above: **The evenness of the light glowing through the wood as he turns helps Johannes maintain a uniform wall thickness of 3/32" on the hat. The bent tool rest in the depth of the crown helps keep his hand steady.**

and about ¼" for shrinkage. That gives me the outside diameter."

Measuring, though, is only half the story of making hats that fit. The rest of the crafting deals with shrinkage and shaping.

Crowns without pith, please

Green wood shrinks more across the grain and parallel to the growth rings than it does perpendicular to the growth rings. Shrinkage along the length—in most woods—is negligible. In making wooden hats from green wood, these realities are crucial.

"The hat brim, not the crown, almost always faces the pith," says Johannes, turning a log chunk over. "That way, the brim will bend easily up and out from the center of the log. And the crown will distort into an oval as the wood dries. To get the oval shape to fit a head, I need the wood to shrink across the grain. But normal shrinkage isn't enough. That's why I clamp it later and let it dry (see photo *below*). Also, turned hats want to dry in a somewhat bulbous shape, and the clamps help reduce that."

Making the most of wood

Just counting lathe time, Johannes can turn a wooden hat in a couple of hours *(see photos)*. "A hat sure takes a lot of wood," you might say. At first glance, it seems so. But as a businessman as well as a turner, Johannes has learned that waste doesn't make money.

The ring of wood that he parts off the brim becomes a mirror frame. From the wood removed in hollowing the crown, Johannes creates mini hats. And from the wood removed from inside the mini hats he makes micro hats that will fit on your thumb!

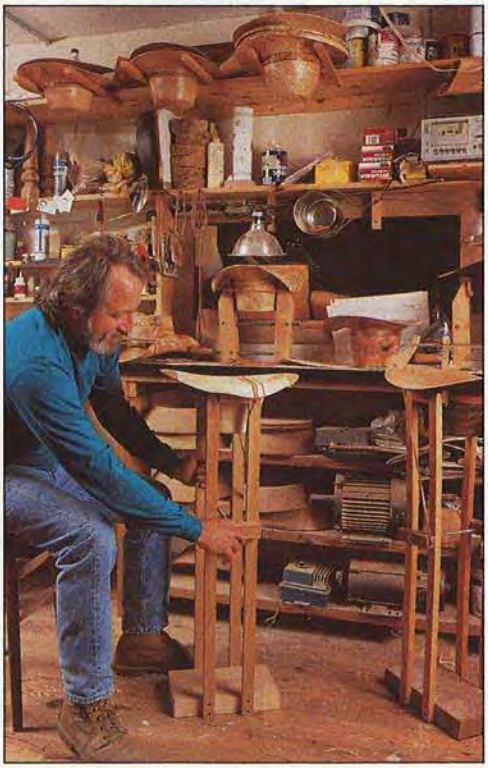
No matter the size of the hat, though, he'll sand each with 120- through 220-grit abrasive, then brush-coat it with lacquer on the lathe to slow down the drying. The coating also protects a hat from stains and finger marks during handling, and any discoloration from the rubber bands used in the bending rack.

After spending two or three days in a bending rack, a hat requires a day's clamping. Then, Johannes sprays on 10 coats of lacquer. When a hat is completely dry, he polishes it with a superfine, micro-grit abrasive.

Despite all the thought and turning skill that go into the making of his wooden hats, Johannes laughs at any reference to working the green wood as a "science." According to the turner, "With enough experience, you don't need science."

Want to see more hats?

For a brochure describing Johannes' wooden hats, write with a SASE to: Johannes Michelsen, P.O. Box 562, Manchester Center, VT 05255.



Written by Peter J. Stephano
Photographs: Steve Uzzell

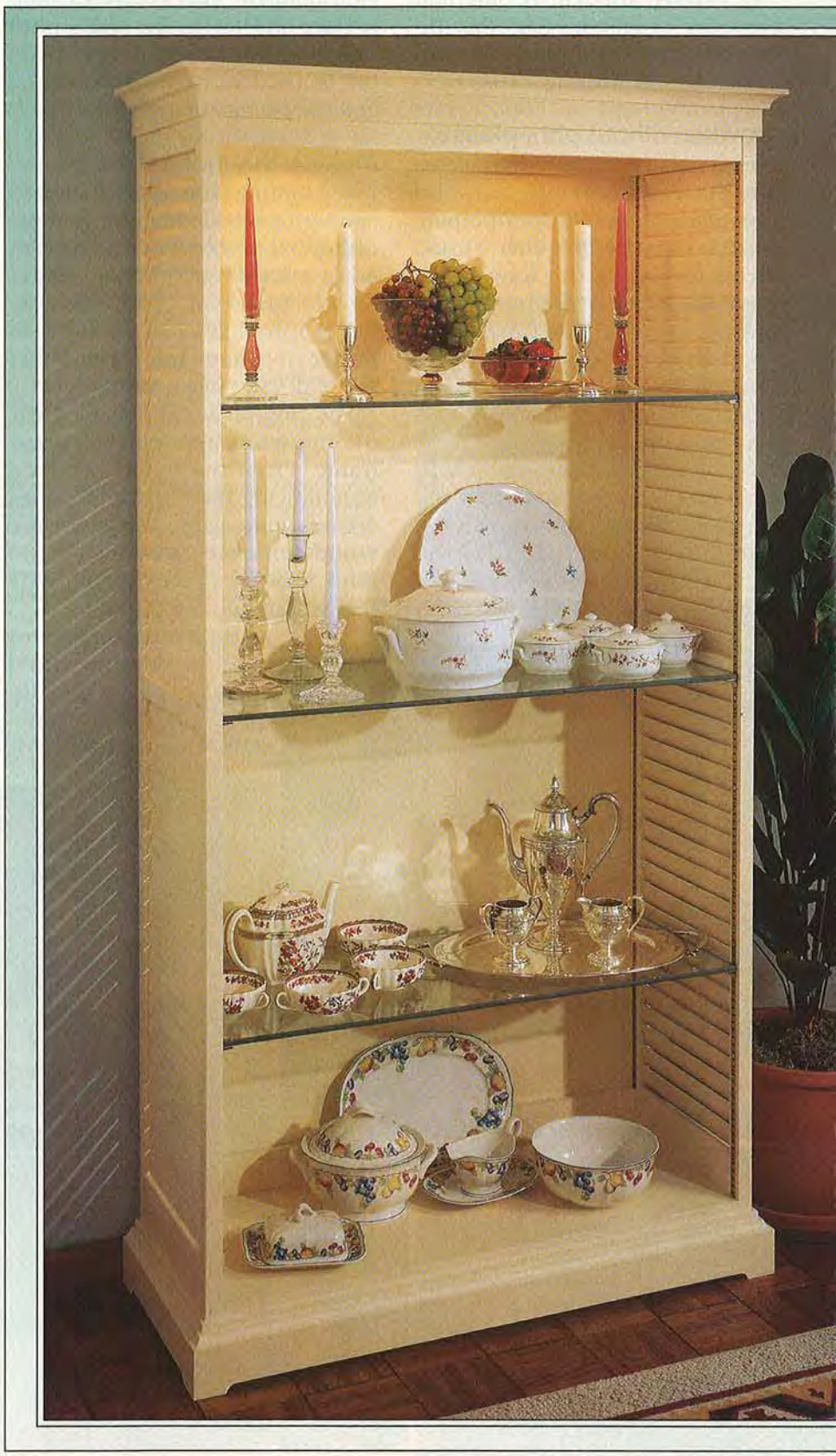
Top left: **Some final turning on the crown completes the hat. The dark color on the "band" was created by burnishing the turning wood with a scrap of padauk. "Exotic woods, such as ebony, purpleheart, padauk, and rosewood, are my crayons," says Johannes.**

Bottom left: **As the hat nears completion, Johannes blows out moisture from the thin green wood with compressed air to speed up drying.**

Left: **Under tension from rubber bands, hat brims dry to shape in 2–3 days. From the racks, hats move to the workbench, where Johannes clamps the crowns into more of an oval shape.**

SIMPLY SENSATIONAL Shutter

This stylish, but easy-to-build, shelving unit has lots going for it. Thanks to the exterior window shutters, the carcase goes together in a hurry. And by incorporating adjustable shelf standards into the design, we've made changing the spacing between the glass shelves a breeze. And if that weren't enough, we've included a couple of can lights to cast a flattering glow onto your collectibles sitting on the shelves.



For starters, let's construct the basic carcase

1 Start with a pair of 15×71" exterior wood shutters. (We purchased ours at a local home center for under $26 each.) Note that these are nominal dimensions; each shutter actually measures 14¾×71½". If the shutter stiles protrude past the edges of the rails (ours protruded about 1/16"), trim the ends of the stiles flush with the edges of the rails.

2 Install a 5/8" dado head into your tablesaw, and adjust it to cut 3/16" deep. Cut a groove in a piece of scrap stock, and check the fit of the shelf standard in the groove. Adjust the cut if necessary. (See the Buying Guide for our source of shelf standards and lights.) Now, cut a groove along the *inside face* (with the wide rail at the bottom and louvers pointing down) of the shutter stiles. See the Exploded View and Carcase drawings for reference.

3 Cut a ¾" rabbet ¾" deep along the *inside bottom edge* (across the wide rail) of both shutters.

4 Cut a pair of filler blocks to 3/16×5/8×2⅜" to fill the bottom end of the groove running along the back edge of each shutter stile.

Shelving

Bill of Materials					
Part	Finished Size			Matl.	Qty.
	T	W	L		
CARCASE					
A sides	1 1/16"	14 3/4"	71 1/2"	S	2
B top stretchers	3/4"	1 5/8"	36"	P	2
C bottom stretcher	3/4"	2 5/8"	36"	P	1
D bottom	3/4"	14 1/2"	37 1/2"	PL	1
E banding	3/4"	1/4"	37 1/2"	P	1
TOP					
F panel	3/4"	14 1/4"	37 7/8"	PL	1
G* front & back	3/4"	3"	38 5/8"	P	2
H* sides	3/4"	3"	15"	P	2
I* front cove	9/16"	1 3/4"	41 1/8"	C	1
J* side coves	9/16"	1 3/4"	16 1/4"	C	2
BASE					
K front & back	3/4"	2"	37 7/8"	P	2
L sides	3/4"	2"	14 1/4"	P	2
M* frt.&back	3/4"	3 1/2"	38 5/8"	P	2
N* sides	3/4"	3 1/2"	15"	P	2
O* front molding	3/4"	3 1/2"	40 1/8"	P	1
P* side molding	3/4"	3 1/2"	15 3/4"	P	2
Q back	1/8"	37 5/8"	73"	H	1

*Initially cut parts oversized. Then, trim each to finished size according to the how-to instructions.

Materials Key: S–shutter, P–pine, PL–plywood, C–cove molding, H–hardboard.

Supplies: two 15x71" exterior shutters; #8x1/2", #8x1 1/4", #8x1 1/2", and #8x2 1/2" flathead wood screws; #8x1/2" roundhead brass wood screws for can lights; #18x3/4" brads, primer and paint, 3/8" glass for shelves.

Buying Guide

Shelf standards and lights. Two fixed-focus can lights, polished brass, with 40-watt bulbs. The starter unit has a 10' line cord with roll switch, and one 24" connector cord with a female plug for adding the second light. Add-on unit (second light) has bulb and two 24" cords. Catalog nos. SPL8 and SPL9. Four 72" shelf standards, #125B6, and shelf supports, #SS21B. Constantines, 2050 Eastchester Rd., Bronx, NY 10461 or call 800/223-8087 to order.

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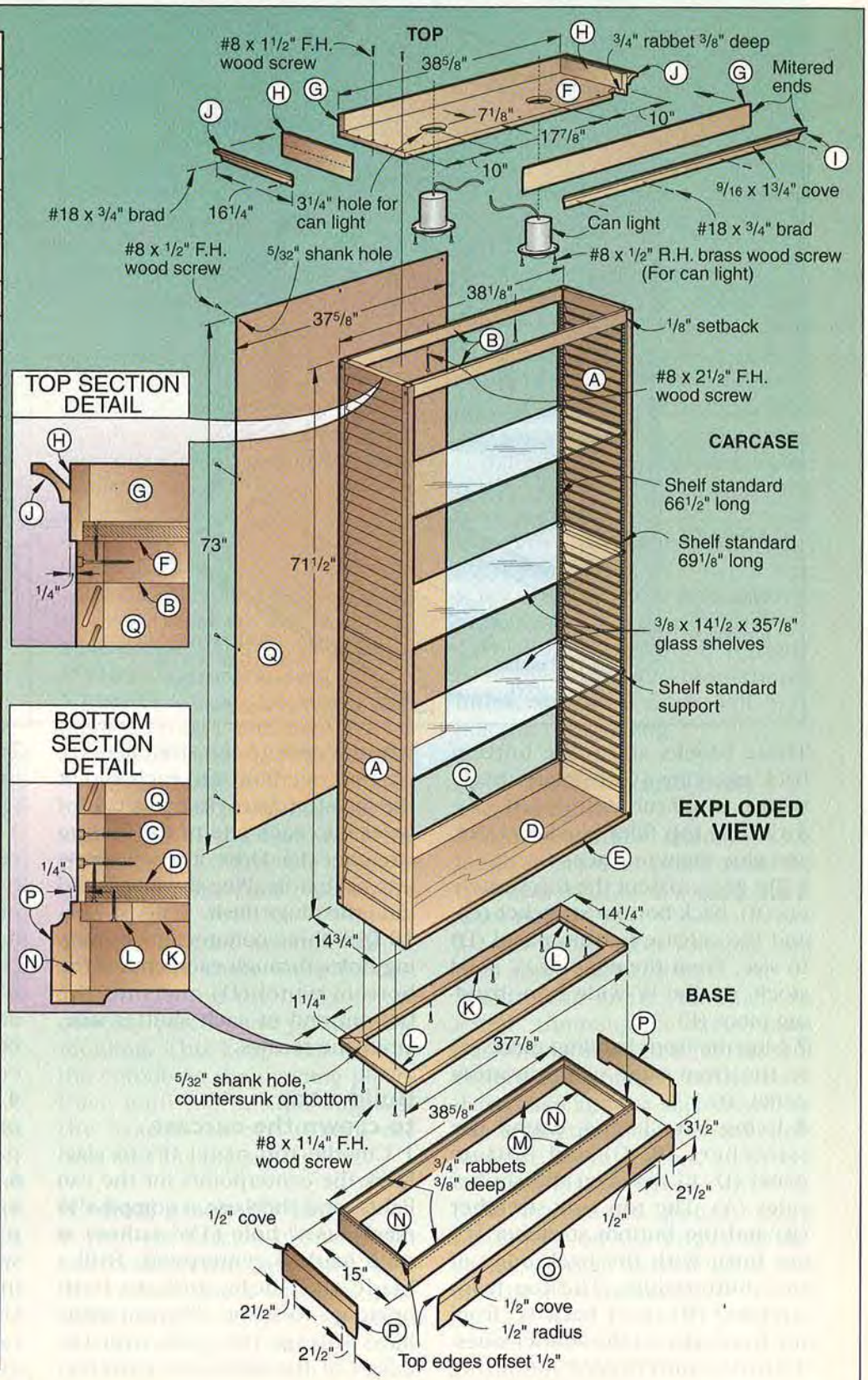
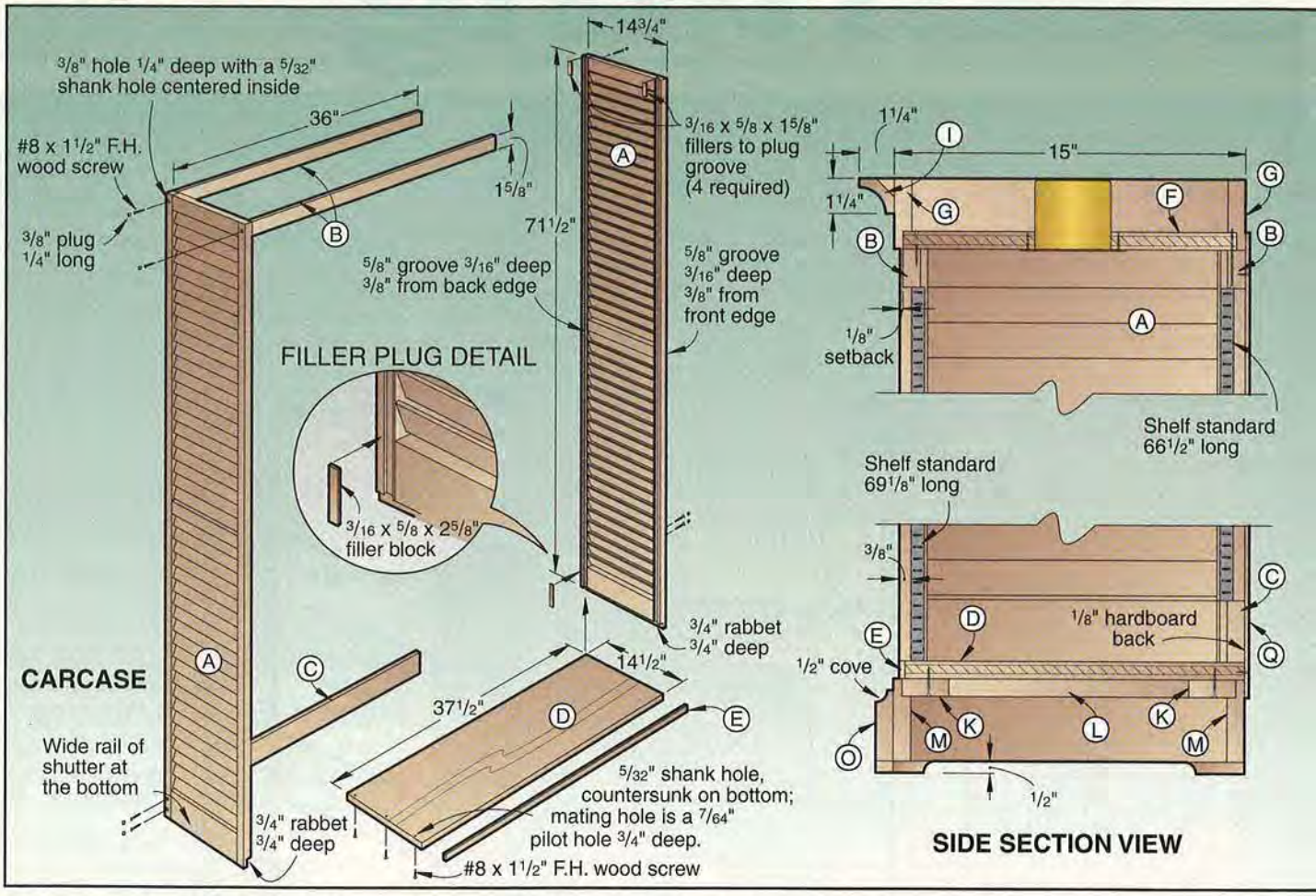


Shutter Shelving


14 3/4"
3/8" hole 1/4" deep with a 5/32" shank hole centered inside
36"
#8 x 1 1/2" F.H. wood screw
1 5/8"
3/8" plug 1/4" long
71 1/2"
3/16 x 5/8 x 1 5/8" fillers to plug groove (4 required)
5/8" groove 3/16" deep 3/8" from back edge
5/8" groove 3/16" deep 3/8" from front edge
FILLER PLUG DETAIL
3/16 x 5/8 x 2 5/8" filler block
3/4" rabbet 3/4" deep
CARCASE
14 1/2"
37 1/2"
Wide rail of shutter at the bottom
3/4" rabbet 3/4" deep
5/32" shank hole, countersunk on bottom; mating hole is a 7/64" pilot hole 3/4" deep.
#8 x 1 1/2" F.H. wood screw
1 1/4"
15"
1 1/4"
1/8" setback
Shelf standard 66 1/2" long
Shelf standard 69 1/8" long
3/8"
1/8" hardboard back
1/2" cove
1/2"
SIDE SECTION VIEW

These blocks allow the bottom back stretcher (C) to mate totally with a wood surface.

5 Cut the top filler blocks to size, and glue them in place.

6 Rip and crosscut the top stretchers (B), back bottom stretcher (C), and the carcase bottom panel (D) to size. From the edge of ¾" solid stock, rip the ¼"-wide front banding piece (E).

7 Glue the front banding piece (E) to the front edge of the bottom panel (D).

8 Using bar clamps, clamp the stretchers (B, C) and bottom panel (D, E) between the shutter sides (A). The top rear stretcher (B) and the bottom stretcher (C) are flush with the back edge of the shutter sides. The top front stretcher (B) is set back ⅛" from the front edge of the shutter sides.

9 Drill counterbored mounting holes through the shutters (A) and into the ends of the stretchers (B, C). Drill one hole into each end of the top stretchers (B) and a pair of holes into each end of the bottom stretcher (C). Drive a wood screw into each hole. Plug the holes, and sand the plugs flush.

10 Drill three countersunk mounting holes through each end of the bottom panel (D) and into the bottom end of each shutter side. Drive the screws.

Build a top to crown the carcase

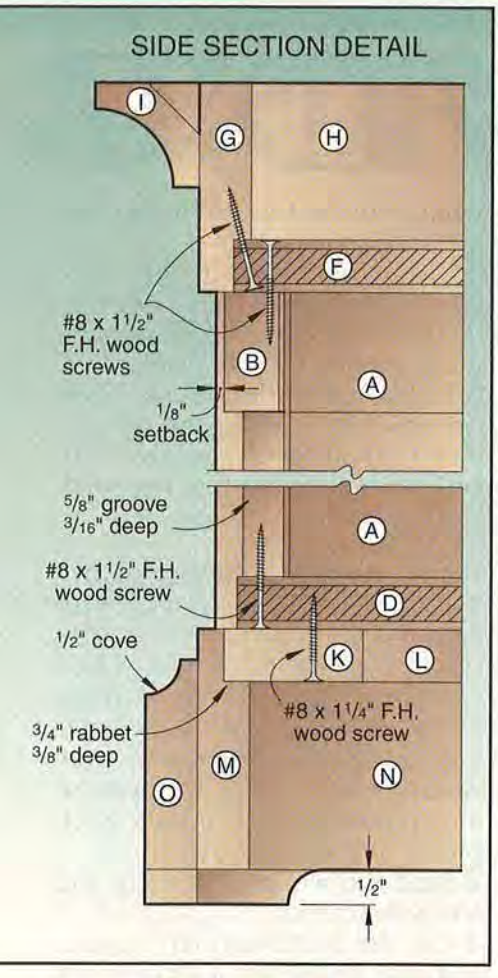
1 Cut the top panel (F) to size. Mark the centerpoints for the can lights, and then use a compass to mark a 3¼" hole (1⅝" radius) at each marked centerpoint. Drill a blade start hole, and cut both openings to shape. The can lights have a flange that will cover the edges of the holes, so a perfect edge isn't necessary.

2 Rip and miter-cut the front, back, and side surround pieces (G, H) to size plus 2" in length.

3 Using the same setup used earlier, cut a ¾" rabbet ⅜" deep along the bottom inside edge of each piece. Then, miter-cut the pieces to fit snugly around the top panel (F). As shown in the photo at *right*, we miter-cut one end, clamped it in place, and used a combination square to mark the cut at the other end.

4 Glue and clamp the surround pieces (G, H) around the plywood panel (F).

5 Cut the front and back cove molding pieces (I, J) to length plus 2". (The home center at which we bought the cove molding referred to it as 9/16×1¾" cove.) Using the miter gauge on your tablesaw, miter-cut the mating ends of the cove molding where shown on the Exploded View



Use a combination square to mark the miter cutlines on the pieces that surround the top plywood panel.

drawing. Attach an auxiliary fence to your miter gauge to prevent chip-out. Turn the top assembly upside down, and glue and nail the front cove into place with #18×¾" wire brads. Fit the side coves (J) in place and mark the cutlines across the back ends for cutting the pieces to length. Be sure to check for tight miters before cutting the side coves to final length.

Now, construct a sturdy base

1 Rip and miter-cut the base frame front, back, and sides (K, L) to size. Glue and clamp the pieces together. Measure diagonally to check for square.

2 Cut the base-frame surround pieces (M, N) to size plus 1" in length. Cut or rout a ¾" rabbet ⅜" deep along the top inside edge of each. Now, miter-cut the pieces to fit around the base frame (K, L). Glue and clamp the base-frame surround pieces (M, N) around the base frame.

3 Rip the base molding pieces (O, P) to width, and crosscut them to length plus 1". Miter-cut the molding pieces to fit around the base-frame surround. Do not glue the molding in place yet.

4 Lay out a ½" notch with ½" radius at each end on each piece of molding. Bandsaw the notches to shape. Sand the flat areas with a palm sander and the radii with a 1"-diameter drum sander.

5 Install a ½" cove bit into a table-mounted router, and raise it to cut ½" deep. Position the router table fence to cut about ⅛" of the cove. Rout the cove along the top outside edge of the base molding pieces (O, P). Move the fence in ⅛" increments until the entire cove is cut.

6 Place the base assembly (K, L, M, N) on ½"-thick scrap blocks. Spread glue on the backs of the molding pieces, and position the molding. This keeps the tops of the cutouts in the molding pieces flush with the bottom edges of the base assembly. Clamp the base molding pieces in place.

It's final assembly time

1 Turn the carcase upside down and position the base flush with the carcase back and centered side-to-side. Clamp the base in place, and drill countersunk mounting holes through the base frame members (K, L) and into the carcase bottom (D). Secure with wood screws.

2 Turn the carcase/base assembly upright, and position the top flush with the carcase back and centered side-to-side. Clamp the top in place, drill mounting holes through the top panel (F) and into the sides (A) and front stretcher (B). Drive the screws. Drill holes through the rear stretcher (B) and into the bottom surface of the top panel (F). Drive the screws.

3 Cut the back (Q) to size from tempered hardboard or plywood. (So the outside edges of the back panel would be less noticeable, we cut the panel ½" less than the carcase width.) Lay the carcase/top/base assembly front side down on sawhorses. Position the back, centered side-to-side on the assembly, and clamp it in place. Drill the holes and drive the screws. See the Side Section View drawing for reference.

4 Position the assembly upright. Glue plugs into all counterbored holes, and sand flush. Fill brad holes in the molding.

Add the finish and then the hardware

1 Prime the entire assembly. (We found it easier to prime with the back removed. Also, a spray finish saves time.)

2 Sand lightly after priming, and then apply a satin enamel.

3 Trim the shelf standards to length, trimming the excess from the *bottom end* of each. This will ensure the notches in the standards align and the shelves will sit flat. Install the standards and clips. Measure the openings, and have ⅜"-thick glass shelves cut to fit. (We ordered a pencil edge machined on the edges of our shelves.) Install the can lights, and add the glass shelves.

Written by Marlen Kemmet
Project Design: James R. Downing
Illustrations: Roxanne LeMoine
Photographs: Bill Hopkins

Handy roll-around tool storage

SPACE-SAVING

If you're looking for a quick way to add another work surface and more tool storage to your shop, look no further. This project fills the bill in both regards. The multi-drawer roll-around tool cabinets hold a ton of tools, and when pulled out, they can function as yet another work surface.

Note: The plywood cabinet surrounds in the Exploded View drawing are dimensioned to fit a Stanley Proto 27"-high storage cabinet. If you choose another make or model of rolling cabinet, be sure to change the dimensions of your wooden surrounds to fit. Plan for about ½" of clearance around the sides and top of the rolling cabinets.

Start with a pair of matching cabinets

1 Cut the side panels (A) and back panels (B) to the sizes listed in the Bill of Materials from ¾" plywood.
2 From ¾" solid stock (we used maple), cut the trim strips (C, D) to size, and glue them to the front and bottom edges of the plywood side panels.
3 Cut the top cleats (E) and bottom caster guides (F) to size. The caster guides center the rolling cabinet in the opening, preventing the inside of the cabinet and the outside of the rolling cabinets from rubbing against each other when moving the cabinet in and out of the surround.
4 Glue, clamp, and screw the two cabinet surrounds (A–F) together in the configuration shown on the Exploded View drawing.
5 Finish-sand both cabinets. Mask the solid stock, and paint the plywood. Then, mask the plywood, and add a clear finish to the solid-wood banding.

Add a heavy-duty worktop

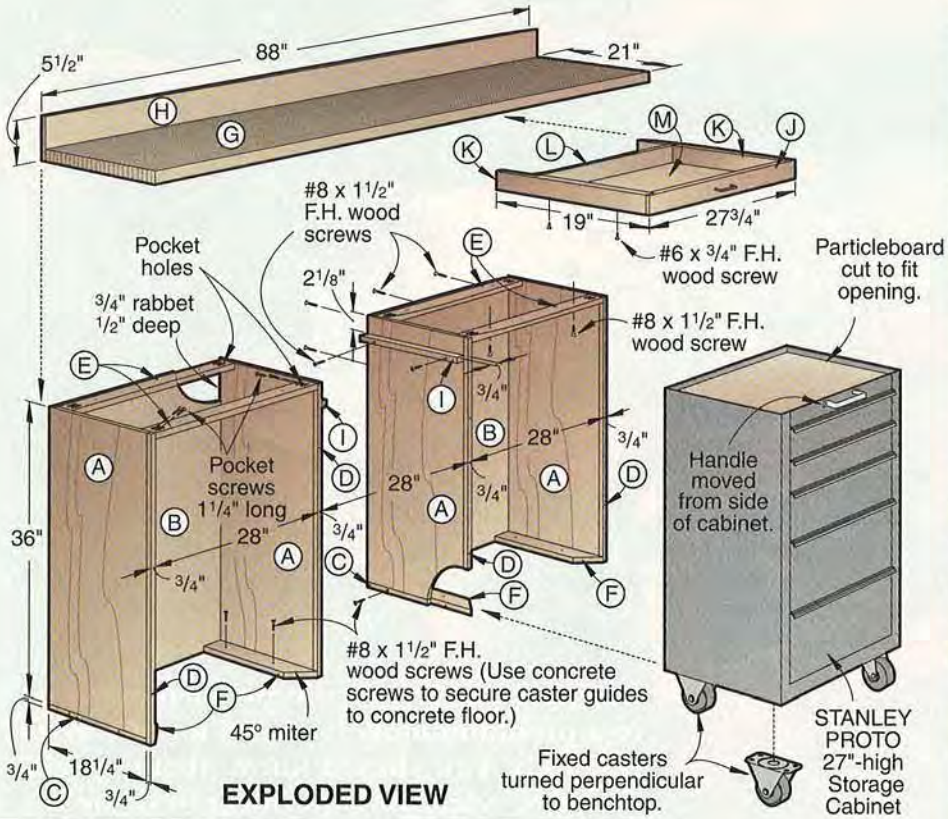
1 To form a worktop (G) for your cabinets, cut enough 1½"-wide strips, and glue them face to face to form a top measuring 1½×21×88". You also can opt for a less-expensive worktop by laminating two pieces of ¾" plywood and trimming the edges with pieces of ¾×1½" hardwood.
2 Sand the worktop smooth, and add a clear finish.
3 Cut the backboard (H) to size, and glue and screw it to the back edge of the worktop.
4 Position the wood cabinets exactly 28" apart (measure between the cabinet tops at front and back ends). Drill mounting holes through the cleats (E) and into the bottom side of the worktop. Screw the top in place, holding the cabinets squarely apart. You should have a ½" overhang on each end of the worktop.

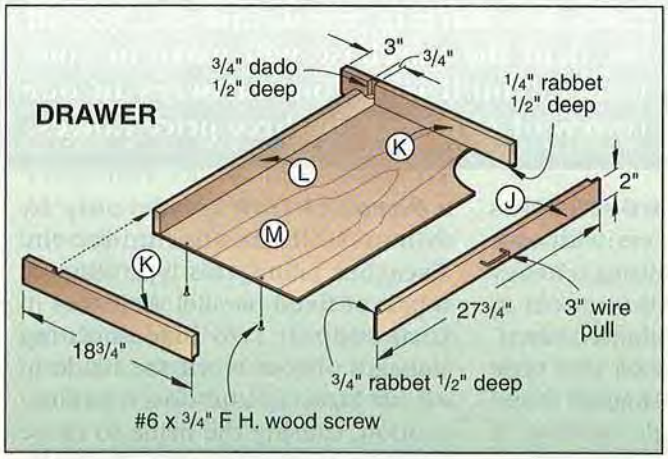
And now, add a drawer for helpful storage

1 Cut the drawer guides (I), drawer front (J), sides (K), back (L), and bottom (M) to size.
2 Cut the rabbets and dadoes in the drawer parts where shown on the Drawer drawing. Construct the drawer, and add a 3" wire pull to its front.
3 Drill mounting holes, and screw the guides (I) in place.
4 Fit the drawer between the cabinets on the drawer guides.

WOOD magazine's IDEA SHOP

WORKBENCH





Some final fixes make it work all the harder

1 To make it easier to grasp the cabinets to roll them in and out of the surrounds, drill two mounting holes, and add a wire pulls or handle to the front of each metal cabinet. Or, if your metal cabinet has a handle on the end, relocate it to the front of the cabinet. Next, mount the fixed casters so that they roll *perpendicular* to the benchtop.

2 Finally, position the workstation in your workshop. Drill a pair of mounting holes through the caster guides (F) and into the floor (you'll probably have to use a concrete bit, depending on your floor construction). Secure the caster guides to the floor to keep the workbench stationary.

Written by Marlen Kemmet
Project Design: James R. Downing
Illustrations: Roxanne LeMoine
Photograph: John Hetherington

Bill of Materials

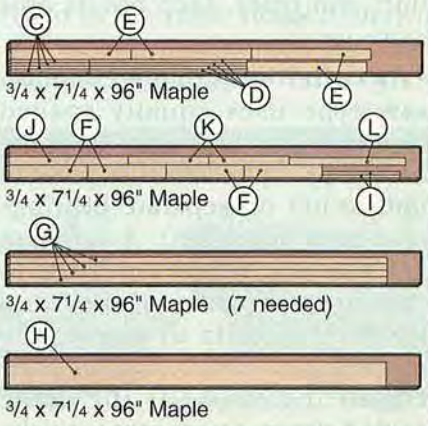
Part	Finished Size T	W	L	Matl.	Qty.
CABINET SURROUNDS					
A side panels	¾"	18¼"	36"	P	4
B backs	¾"	29"	36¾"	P	2
C trim	¾"	¾"	18¼"	M	4
D trim	¾"	¾"	36¾"	M	4
E cleats	¾"	2½"	28"	M	4
F caster guides	¾"	3"	18¼"	M	4
WORKTOP					
G worktop	1½"	21"	88"	LM	1
H backboard	¾"	5½"	88"	M	1
DRAWER					
I guides	¾"	1"	18¼"	M	2
J front	¾"	2"	27¾"	M	1
K sides	¾"	2"	18¾"	M	2
L back	¾"	1¾"	27¼"	M	1
M bottom	¼"	15¾"	27¼"	P	1

Materials Key: P–plywood, M–maple, LM–laminated maple

Supplies: 5–3" wire pulls (if needed), 1¼"-long pocket screws, #6×¾" flathead wood screws, #8×1½" flathead wood screws, primer, enamel paint, clear finish.

CUTTING DIAGRAM

In addition to the boards below, you'll need two sheets of ¾ x 48 x 96" plywood for parts A and B, and ¼" plywood for part M.



The wide world of

Buying your first scrollsaw, or moving up to a premium model, takes a lot of careful research. You should know about special features, what tools perform best for the tasks you have in mind, and the size of the dent the purchase will make in your wallet. You'll find your answers in our review of 23 models in three price ranges.

Where scrollsaws differ

Look over a group of scrollsaws and you'll quickly see three distinct arm types. Each has its pros and cons.

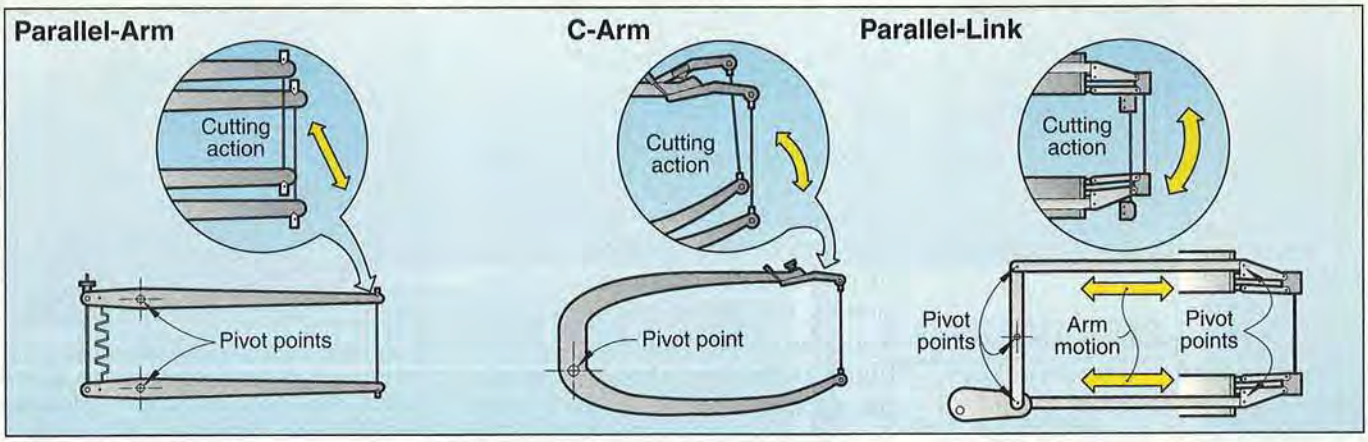
• ***Parallel-arm.*** This common saw type uses equally spaced blade-holding arms that are connected by a link and that pivot in unison but on separate bearings (see *next page, top*). A separate link that attaches the lower arm to the motor works to raise and lower the blade in an almost vertical path. Only at the beginning and end of the stroke is the blade angled down or up respectively. As a result, parallel-arm scrollsaws let you cut tight corners with ease and control, and without heavy stock removal. They do not cut as quickly as the following two saws.

• ***C-arm.*** Scrollsaws of this type consist of a rigid C-shaped frame that pivots on a single bearing. A drive shaft extending from the motor and attached to the lower arm of the C pulls the blade down at an angle, making for the most aggressive cutting stroke of the tested saws. That said, C-arms will not cut tight curves in thick stock as effectively as parallel arms. But they do excel at production work where cutting speed is important.

• ***Parallel-link.*** Made only by Sommerville Design under the Excalibur brand, this type features a pair of fixed parallel arms that in turn support two blade-holding linkages. These work the blade in an arching up-and-down sawing motion, causing the blade to move slightly toward the work at the middle of the stroke, and away from the work when the blade is fully raised or lowered. Because only the blade-holding linkage moves instead of the long arms, this scrollsaw type vibrates little, allowing for maximum control while cutting tight, clean corners. And, though parallel links cut

SCROLLSAWS

Learn what makes a cutting-edge tool in our test of 23 models



faster than parallel-arm saws, they're not as fast or aggressive as C-arm saws.

Good performance starts with low vibration

Due to the rapid movement of the arms and drive mechanism in a scrollsaw, vibration exists in every machine. In fact, some tools vibrate to the point of dramatically affecting cutting quality and control, causing the workpiece to catch on the blade teeth and jerk up and down. Of the saws we tested, the Woodtek 826398 vibrated the most due to an imbalanced crankshaft. On the other hand, the Hegner 14E and the two Excalibur models ran the smoothest when operating at full speed.

Interestingly, many other saws (such as the RBIs, the Sears and Delta C-arms, and the Hegner Multimax 18 and Multimax 22, for instance) performed equally well when we slowed the tools down slightly. We discovered a cutting "sweet spot" on these and other variable-speed saws—that is, a speed at which the tools cut at an optimum level.

What should you watch for? For starters, try running the saw if the retailer you plan to buy it from has a floor model. Unless a well-timed counterbalancing weight or action exists in the linkage, you'll feel a vibration transferring through the entire saw. Loosely fitting parts in the arm/motor linkage result in the same poor performance.

Provide a solid base

In addition, an improperly tensioned blade, poorly assembled tool, or wobbly stand can cause a tool to shake. Assuming that the first two problems are quick fixes, we'll focus on the third.

Fortunately, you can dampen much of a tool's vibration by supplying a firm base. With benchtops, simply attach your tool to a ¾"-thick rectangle of plywood. Then, place a same-sized piece of carpet pad beneath the plywood, and clamp (or bolt) the assembly to a rock-solid workbench with leg support directly beneath the saw. (Avoid mounting the saw in the middle of the bench where the benchtop may have some unwanted springiness.) Better yet, build our sturdy but inexpensive benchtop scrollsaw stand featured on *page 14*.

Metal stands—standard with many of the mid- and high-priced machines—come in a variety of configurations and heights. While some suit seated scrollsawyers (two of the three Hegners shown, for instance), taller models accommodate standing scrollsawyers.

Continued

Scrollsaws priced under $300

RBI offers a special wheelchair accessible leg package for its Hawk Ultra 226 scrollsaw.

RBI created a special stand just for wheelchaired woodworkers, shown above. Overall, we liked the three-legged stands for uneven shop floors. The rear leg on Delta's C-arm stand adjusts, letting you tilt the tool forward for more scrollsawing comfort.

Blade installation: the quicker, the better

For scrollsawyers who make lots of inside cuts, quick blade changing is a must. Here's what to look for in this area.

• ***Blade-tensioning systems.*** Nothing is more frustrating than having to take several minutes to replace a broken blade or reinstall an upper blade end. Today, several manufacturers offer quick-blade-change systems so you can complete these processes in seconds.

In our tests, we preferred cam-operated tension-release levers or threaded rod-type knobs at the easy-to-reach front of the machines. Several scrollsaws feature blade-tensioning mechanisms at both the front and rear locations. With these, you first use rear tensioning when installing a new blade. Then, when making inside cuts, you simply work only with the front quick tension-release system to rapidly disengage and reengage the top of the saw blade.

Heading the class in ease of blade changing was Excalibur's EX30, shown *right*. It impressed us that the upper clamp didn't rotate out of place while clamping and tensioning the upper blade end. The upper arm also lifted up for handy blade threading through workpiece blade start holes. In a close second were the Deltas; the RBIs and Hegner's Multimax 22 tied for third place.

• ***Blade-clamping systems.*** These consist of two metal blocks that tighten down on the flat, straight ends of plain-end scrollsaw blades. Most of the tested saws feature this system. One, however, employs only pin-type blades—blades with small metal pins running through their ends. Here, the blade-holding systems amount to springy metal forks or grooved arm ends that the blade pins rest in once fully tensioned. You'll note in our chart that some saws provide the holders needed to use both blade types.

Why is this important? If your scrollsawing interests lie solely in cutting out patterns or making large interior cuts, a pin-type blade system may be just what the doctor ordered. But, though pin-type blades change quickly and easily,

Excalibur's cam-operated tensioning lever and thumbscrew-action blade clamp help you install upper saw-blade ends quickly.

their blade ends require at least a 3/16" blade start hole. That would make them a poor choice for fine fretwork. By contrast, plain blades come in a much broader range of tooth patterns and sizes (and slightly lower prices). In the plain-end type you can buy fine blades for delicate materials, those with reverse teeth at the bottom for avoiding chipout, and blades for cutting glass, bone, and metal.

Blade types aside, blade clamps remain at the heart of any quick-blade-changing system. These systems include levers or thumbscrews that open and lock the clamps in seconds. Those not considered quick-blade-change machines typically have setscrews in the blade clamps. These systems require one or two tools to install the blade ends, a task that devours precious time, especially when making inside cuts.

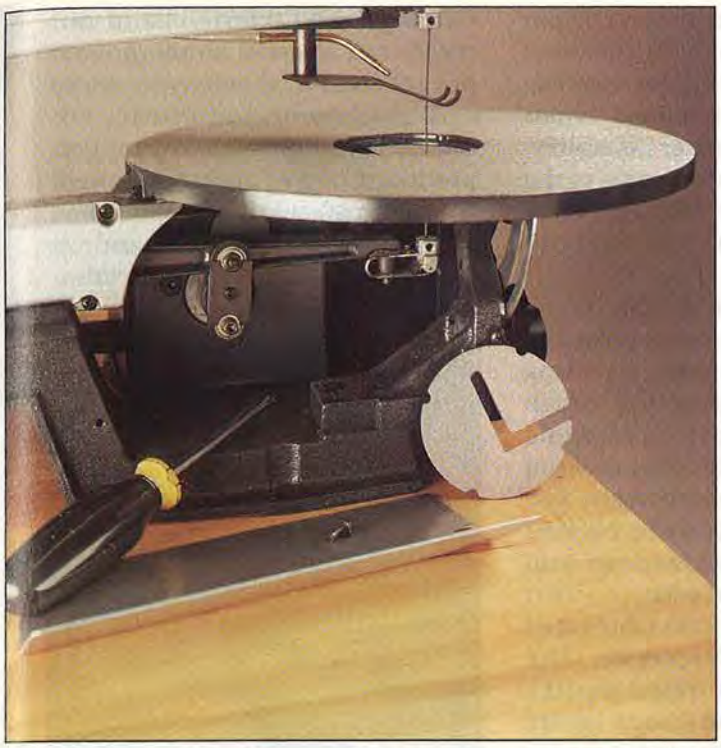
Scrollsaws priced under $300 *Continued*

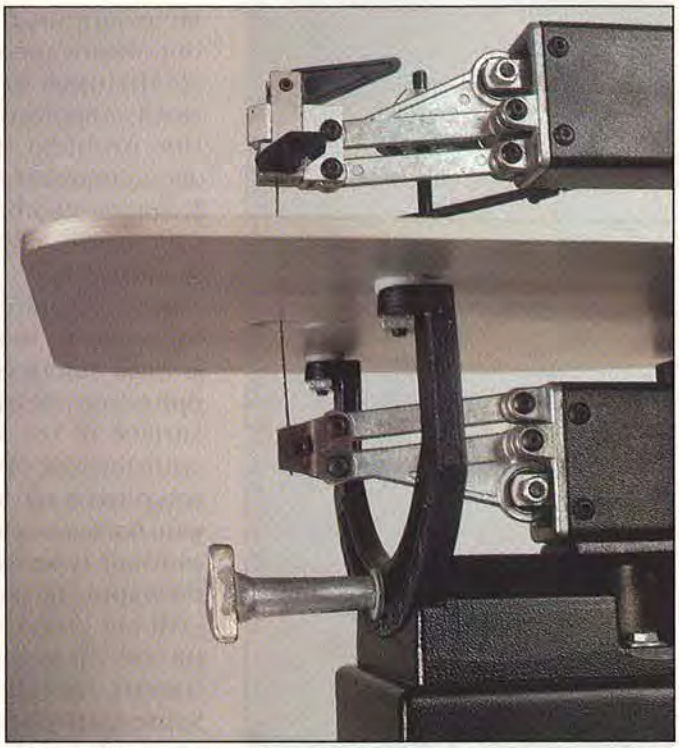
Grizzly G1257

Grizzly G1572

Grizzly G1060

Skil 3333





With some of the lower-priced scrollsaws, such as the Dremel *left,* you need to remove a side cover to get at the lower-blade clamp. The Excalibur's lower-blade clamp, shown *right,* is exposed and easy to reach when changing blades.

Perhaps most irritating of all are those machines that make it difficult to install the lower blade ends beneath the saw tables. With the low-price-range Dremels, the Ryobi SC160, and the Skil 3333, you have to remove side-mounted covers and work in a confined space—a tough task for those with big hands. (See photos *above.*) And with some tools, you must take the upper and lower clamps out to complete the installation.

Machines offering user-friendly lower-clamp access include the Tradesman 8350, the Sears 236090, the Grizzlys, Deltas, RBIs, Hegners, and the Excaliburs.

More features to consider

Consider these other important components to better customize your scrollsaw selection.

• ***Throat depth.*** In our roundup, we included saws that span from a 14" throat depth (the clearance between the blade and the back of the saw where the arms connect) to 30". How much is enough?

Only you know what kinds of projects you will try. But, if you go by the sizes of scrollsaw patterns found in this publication, you may find that a saw with a 16" to 18" throat depth handles most tasks. Note, too, that some saws let you turn the blade 90°, expanding your capacity for extra-long workpieces. With regard to the actual depth of cut, the range here goes from 2" to 2 ⅝".

• ***Table talk.*** Larger workpieces require more support and therefore a larger table. If your choices boil down to two saws equal in performance, buy the one with the larger table. The RBIs feature some of the largest tables on the market (now with improved table-locking systems); the Sears 236400, Woodtek 826398, and the Delta 40-650 also stand out for all-around workpiece support.

Manufacturers use cast iron, sheet aluminum, anodized (or

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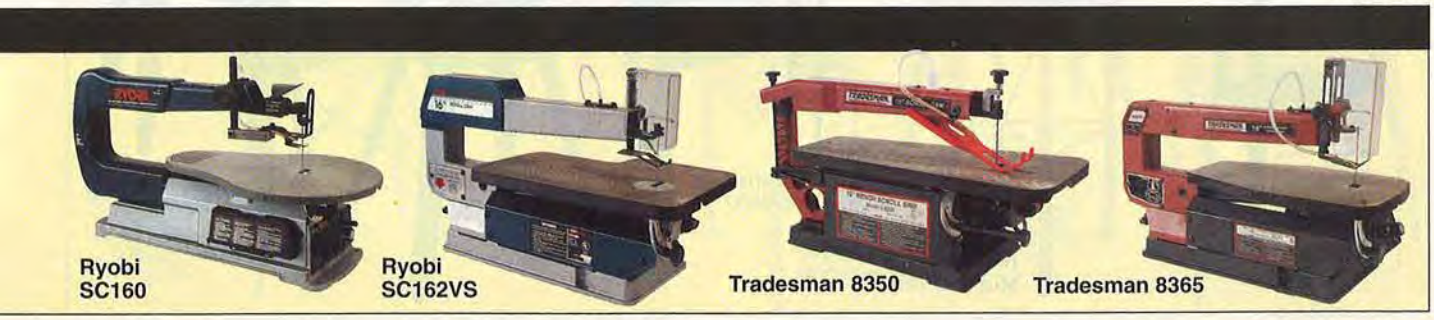
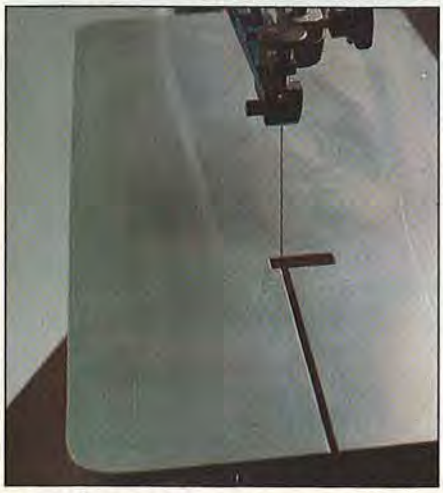




A roughly finished table surface like that of the Sears C-arm, *top photo,* can cause resistance when cutting a workpiece. The smooth surface of the Hegner saw, *bottom photo,* avoids this problem.

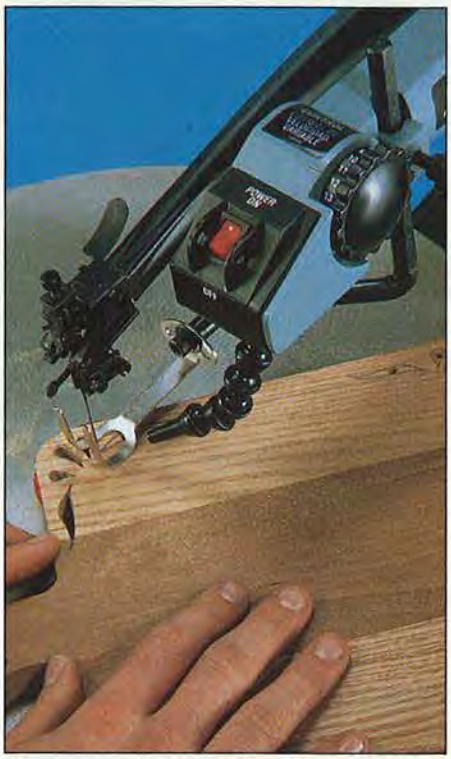
coated) aluminum, and alloy aluminum for scrollsaw table construction. While the sheer weight of a cast-iron table helps dampen vibration, the table surface needs to be coated with wax to prevent rusting. By contrast, aluminum tables do not rust; they are light but when uncoated can leave a small black streak on cutting stock. Anodized aluminum avoids this problem. Harder, tougher, alloy-aluminum tables, such as the Hegners, combine the rigidity of cast iron with an ultra-smooth work surface.

Keep in mind that table finish becomes an issue only when the surface interferes with a cutting operation. (Compare the rough surface of the Sears C-arm table with the smooth Hegner table in the photos *left.*) Fortunately, you can fix a rough surface by first sanding it smooth, wiping, and then applying paste wax.

All but one scrollsaw table tilted to 45° in one direction. The Grizzly G1060 stopped at 30°. Some tools, as indicated in the chart, tilt to the left *and* right for trouble-free bevel cutting.

• ***Air blowers.*** Every saw features a device for blowing sawdust from the cutting area. Usually, these consist of a bellows, an air hose, and, in some cases, a nozzle. Delta's model 40-650 delivered the strongest air jet, and we especially liked systems that blow dust sideways—not at you. These tools were the ones with an adjustable metal nozzle extension at the end of the air hose.

• ***Things electrical.*** All of our scrollsaws showed ample power, but differed in motor type, speed options, and switches. For instance, those with DC motors produced power and torque right from the start; they maintained power cutting thick stock, and yet could operate at very low speeds.



The most innovative saw in the bunch, Delta's 40-650, introduces a convenient above-table switch that couples an on/off rocker with a variable-speed dial.

Scrollsaws priced between $300 and $799

By contrast, tools with AC induction motors slowed markedly under heavy loads. At low speeds, AC variable-speed saws showed limited power when challenged. Universal motors provide basic service, while their close cousins, the permanent-magnet motors, offered more reliable variable-speed performance.

Related to this, variable-speed scrollsaws have an edge over one- and two-speed saws. Though for most cuts in wood, one- or two-speeds do the job reasonably well, variable-speed tools give you superior cutting control. They lead the pack at cutting thin stock, metal, glass, and making fine cuts.

Scrollsaw switches take the form of a lever or toggle, a rocker switch, and a rotary dial. (The 19" Excalibur uses an in-line switch located in the cord.) With some rotary dials, you simply pull out the dial to start the saw. Others combine a dial with an on/off toggle or rocker. While some switches seemed out of the way, the most convenient switch of all belongs to Delta's variable-speed C-arm shown *left*. Its above-table location proved to be a real plus.

Our recommendations

In every price range, we found standouts and value leaders. The costlier tools tend to offer more desirable features—deeper throats, less vibration, variable speed, and superior blade-changing systems.

In the under $300 benchtop class, we like Delta's two-speed 16" scrollsaw, model 40-560, for its up-front lever-action blade clamp and lever tensioning system. The tool's table provided all-around support, and the cutting quality, though slightly aggressive, impressed us.

For best value, we give the nod to Grizzly's G1060 and the Sears 236090. The Grizzly is the only tool in this price range that features a 22" throat depth. And though its table is small, it serves most needs. Spend another $30 for an updated aftermarket blade-clamp system from Seyco (see the phone number in the chart on the *following pages*) and you'll have a real winner.

We placed the Sears tool in the same boat because it offers variable speed, a quick-blade-change system, and ran admirably well. All of this for only $160!

Every tool in our mid-priced range ($300-$799) comes with a stand, except for the Hegner Multimax 14E. (The stand shown with the 14E *below left* is optional.) In a tight race, however, this tool outperformed the competition. Small table aside, it proved to be the smoothest-running saw in the test. That, coupled with a high-quality quick-blade-changing system, made it the ideal tool for fine cutting work such as that found in marquetry.

The innovative Delta 40-650 takes home the top-value award in the entire test group. Its stand adjusts, letting you tilt the DC-motored saw forward for more convenient cutting. The lightweight, graphite C-arm kept vibration to a minimum while the up-front quick-blade-change system made inside cuts a breeze. Also, only the Delta 40-650 offers an easy-access above-table switch and variable-speed dial.

In the over $800 range, nothing topped Excalibur's EX30. For its smooth, clean operation, quick blade changing, and 30" throat depth, it owns the spotlight. Our tester, along with our staff project builders, praised the way the upper arm lifts so you can quickly and easily feed the blade through a blade start hole for inside cuts.

Finally, after a lively debate, we chose RBI's model 220V as our top-value award winner. It offers quality performance and a wide range of desirable features at a fair price. There were, however, several very close runner-ups.

Continued

Scrollsaws priced over $800

Excalibur EX19SD
Hegner Multimax 18
RBI Hawk 226 Ultra
RBI Hawk 220 Ultra
1996 WOOD MAGAZINE EDITORS' CHOICE TOP VALUE
Excalibur EX30
1996 WOOD MAGAZINE EDITORS' CHOICE TOP TOOL
Hegner Multimax 22

SCROLLSAWS FROM $100 TO $1300

PRICE RANGE	MANUFACTURER/ IMPORTER	MODEL	ARM TYPE (1)	AMPS	MOTOR		CAPACITY (INCHES)			TABLE			PERFORMANCE (8)				
					SPEED (2)	TYPE (3)	THROAT DEPTH	MAXIMUM DEPTH OF CUT (4)	STROKE LENGTH (5)	MATERIAL (6)	SIZE W X L (INCHES) (7)	TILT RANGE LEFT/RIGHT (DEGREES)	TABLE QUALITY	VIBRATION	EASE OF CHANGING BLADES	EASE OF UPPER BLADE CLAMPING FOR INSIDE CUTS	EASE OF LOWER BLADE CLAMPING (ACCESS)
$0 - $300	DELTA	40-560	PA	1.2	2	IND	16	2	3/4	CI	11 3/4 R	45L	G	G	G	E	G
	DREMEL	1672	PA	1.7	2	UNIV	16	2	7/8	AL	12 R	45L	F	F	F	G	F
		1695	PA	1.2	VAR	PM	16	2	13/16	AL	12 R	45L	F	G	P	F	P
	GRIZZLY	G1572	PA	1.6	1	IND	15	2	3/4	CI	7 3/4 x 17	45L	G	F	G	G	E
		G1257	PA	1.7	VAR	UNIV	16	2	5/8	CI	8 x 14 1/2	45L	F	F	G	F	G
		G1060	C	2.5	1	IND	22	2	11/16	CI	8 3/4 x 17 3/4	30L	F	G	F	P	E
	RYOBI	SC160	PA	1.6	1	IND	16	2	3/4	CI	10 x 15	45L	F	G	G	F	F
		SC162VS	PA	1.2	VAR	PM	16	2	13/16	AL	10 3/4 x 14 1/2	45L, 18R	G	F	F	F	G
	SEARS CRAFTSMAN	236090	PA	1.2	VAR	PM	16	2	7/8	AL	12 SQ	45L	F	G	G	G	F
	SKIL	3333	PA	1.6	1	IND	16	2	7/8	AL	10 x 16 1/4	45L	F	F	F	G	F
	TRADESMAN	8350	PA	1.6	1	IND	15	2	7/8	CI	7 3/4 x 17	45L	G	F	G	G	E
		8365	PA	2.0	VAR	IND	16	2	3/4	CI	8 x 14 1/2	45L	F	G	G	G	F
$301 - $800	DELTA	40-650	C	1.3	VAR	DC	18	2 1/8	7/8	CI	16 1/2 R	15L, 45R	E	E	G	E	G
	HEGNER	MULTIMAX 14E	PA	2.8	1	UNIV	14	2	5/8	ALAL	7 x 15 1/4	45L	E	E	G	G	E
	RBI	HAWK 216	PA	2.0	VAR	IND	16	2 1/8	7/8	AL	10 1/2 x 18	45L + R	E	G	G	G	G
	SEARS CRAFTSMAN	236400	C	1.3	VAR	PM	20	2	7/8	CI	16 square	35L, 45R	F	G	G	G	G
	WOODTEK	826398	PA	2.2	5*	IND	21	2	1	AL	14 1/2 x 22 1/2	45L, 15R	E	P	F	P	G
$801 - $1300	EXCALIBUR	EX19SD	PL	5.4	3*, **	IND	19	2 1/2	3/4	AAL	12 x 17 1/4	45L + R	E	E	E	G	E
		EX30	PL	3.0	VAR	DC	30	2 1/2	3/4	AAL	12 x 17 1/4	45L + R	E	E	E	E	E
	HEGNER	MULTIMAX 18	PA	2.8	VAR	IND	18	2 3/8	5/8	ALAL	9 x 17	45L, 12R	E	G	G	G	E
		MULTIMAX 22	PA	2.8	VAR	IND	22	2 3/8	5/8	ALAL	9 x 17	45L, 12R	E	F	G	G	E
	RBI	HAWK 220 ULTRA	PA	1.5	VAR	DC	20	2 5/8	7/8	AL	14 1/2 x 22 3/4	45L + R	E	G	G	G	G
		HAWK 226 ULTRA	PA	1.5	VAR	DC	26	2 5/8	7/8	AL	14 x 22 3/4	45L + R	E	G	G	G	G

NOTES:

1. (C) C-arm
   (PA) Parallel arm
   (PL) Parallel link
2. (*) Requires belt change
   (**) Also available as variable speed
   (VAR) Variable speed
3. (DC) Direct current
   (IND) Induction
   (PM) Permanent magnetic
   (UNIV) Universal
4. Per manufacturer
5. As measured
6. (AAL) Anodized aluminum
   (AL) Aluminum
   (ALAL) Alloy aluminum
   (CI) Cast iron
7. Overall measurements/shapes
   R = Round SQ = Square
8. E Excellent
   G Good
   F Fair
   P Poor
9. Requires no tools
10. (FT) Front top
    (LR) Lower rear
    (RT) Rear top
11. (P) Accepts pin-type blades
    (PL) Accepts plain-end blades
    (PPL) Accepts pin-type and plain-end blades
12. (BG) Blade guard
    (BL) Blower
    (BS) Blade storage
    (H) Hold-down
    (HA) Hold-down that adjusts to table angle
    (VP) Vacuum port
    (S) Stand

STANDARD FEATURES											
QUICK RELEASE BLADE CLAMPS (9)	QUICK TENSION RELEASE	TENSIONING LOCATION (10)	BLADE TYPE (11)	OTHER (12)	SWITCH (13)	OPTIONAL ACCESSORIES (14)	WARRANTY (YEARS)	COUNTRY OF ASSEMBLY (15)	WEIGHT (POUNDS)	SELLING PRICE (16)	COMMENTS
Y	Y	FT	PL	BL, HA	A, R	B, FS, ML, S	2	T	47	$ 200	The only machine with a levered quick-change blade holder in this price range. Cuts aggressively.
N	Y	RT	PPL	BG, BL, H, VP	A, R	B, ML, S	2	T	45	170	This two-speed saw offers quick tensioning and upper blade end clamping.
N	N	RT	PPL	BG, BL, H, VP	B, ROT	B, ML, S	2	T	40	240	Variable speed, adjustable hold-down, plus uses both pin-type and plain-end blades.
N	N	RT	P	BL, H	L*	B	1	T	37	110*	Solid basic tool at an extremely low price.
N	N	LR	PPL	BG, BL, HA	B, ROT	--	1	T	40	170*	Poor blade-tensioning location, but scores points for variable speed.
N	N	RT	PPL	BG, BL, HA	L*	--	1	T	60	160*	Very low vibration and deep throat make this C-arm stand out in the low-price range.
Y	N	LR	PPL	BG, BL, BS, H, VP	L	QRBC	2	T	44	150	Lower blade holder hard to reach; built-in blade and tool storage.
N	Y	FT	PPL	BL, BS, HA, VP	B, ROT	QRBC	2	T	24	170	Some vibration, but offset by quick tensioning and variable speed.
Y	N	RT	PPL	BL, BS, HA	B, ROT	B, FS, S	1	U	35	160	A smooth-running variable-speed tool with an adjustable hold-down and quick-blade-change system.
N	Y	RT	PPL	BL, BS, HA, VP	A, L	ML, S	2	T	43	140	Quick blade-tensioning and clamping system, along with a vacuum port.
N	N	RT	PPL	BL, H	L	--	5	T	40	100	A starter saw with some helpful features.
N	N	LR	PPL	BG, BL, HA	B, ROT	--	5	T	41	160	Rear blade tensioning not preferable, but a respectable variable-speed beginner saw.
Y	Y	FT	PL	BL, HA, S	C, R	B	2	U	90	480	The most innovative tool in the test; loaded with features, plus smooth performance.
N	N	RT	PL	BL, H	R	B, FS, ML, QRBC, S	6	G	30	600*	Limited throat depth, but excels at precision work.
N	Y	RT	PL	BL, H, S	C, ROT	B, DT, FS, ML, W	5	U	69	790*	Nicely finished table, some vibration at top speed, but generally a fine tool. Blade changing requires a tool. Effective, new table-locking system.
N	N	FT	PPL	BL, BS, HA, S	B, ROT	B	1	T	143	450	A very aggressive C-arm that excels at production work.
N	N	RT	PL	BG, BL, S, H	R	B, BH, MB	1	T	85	350*	Unwanted vibration, but a large table and stand for the money.
N	N	RT	PL	BL, HA	IL	DK, FS, ML, QRBC, S, TAL	5	C	65	830*	A smooth, powerful machine with many good points. Can be equipped with quick tensioning and lever-action blade clamps. Motor purchased separately.
Y	Y	FT	PL	BL, HA, S	ROT	DK, FS, TAL	5	C	70	1200*	30° parallel-link arms keep vibration nil. This saw features the best blade-changing system in the lot. The lift-up arm for inside cuts is a real bonus as well.
N	Y	RT	PPL	BL, H	C, ROT	B, FS, ML, QRBC, S	6	G	54	1100*	Another precision saw with variable speed, good blower, and easy tensioning.
N	Y	RT	PL	BL, H	C, ROT	B, FS, ML, QBH, S	6	G	70	1300*	This deep-throat scrollsaw vibrates slightly at top speed. Still, a good saw, though at a premium price.
Y	Y	FT	PL	BL, H, S	C, ROT	B, DT, FS, ML, W	5	U	93	990*	Good all-around scrollsaw with desirable features and quality performance.
Y	Y	FT	PL	BL, H, S	C, ROT	B, DT, FS, ML, W	5	U	107	1140*	Big table, quality quick-blade-changing system, two-position blade holders, new table-locking system— this tool has much to offer.

13. (A) Twin switches
(B) Push/pull
(C) Separate speed and power
(R) Rocker
(IL) In-line cord
(L) Lever
(ROT) Rotary
(*) Indicates removable safety switch

14. (B) Blades
(BH) Blade holders
(DK) Drill kit
(DT) Drip-tank system for cutting glass
(FS) Foot switch
(ML) Magnifier light
(MB) Mobile base
(QRBC) Quick-release blade clamp
(S) Stand
(TAL) Pedal-operated top arm lift
(W) Wood

15. (C) Canada
(G) Germany
(T) Taiwan
(U) United States

16. *Mail-order tool; shipping will be added to the selling price.

MANUFACTURERS' PHONE NUMBERS:

Delta 800/438-2486	Hegner 800/322-2226	Skil 312/286-7330
Dremel 414/554-1390	RBI 800/487-2623	Tradesman 800/243-5114
Excalibur by Sommerville 800/357-4118	Ryobi 800/525-2579	Woodtek 800/645-9292
Grizzly 800/541-5537 (West) 800/523-4777 (East)	Sears 800/377-7414	Seyco 800/462-3353

Written by Jim Harrold Technical consultant: Dave Henderson Photographs: Dean Tanner Illustrations: Kim Downing

Turned tops enhance glassware's glamour SHOW

Looking for a great evening at the lathe? You can't miss with these quick, fun, and practical toppers for cork stoppers. See the Buying Guide for our source of glassware and corks.

TWIN-CRUET SET
(See *page 61*)

Project Prep

Stock: Turn the lids, stoppers, or cruet stand from domestic or exotic hardwoods. Blank sizes are:

- Jar lids. . . . . 1×2×2"
- Stoppers . . . . . 1¼×1¼" stock, 2–3½" long
- Large stoppers . . . 1½×1½×2"
- Twin-cruet stand . . 2×5½×5½"

Lathe equipment: 3–4" faceplate, live (rotating) tail center, jaw chuck (if available).

Turning tools:

- ¼" and ½" spindle gouges
- ½" and 1" skews
- 3/16" parting tool

Lathe speeds:

- Roughing: 500–800 rpm
- Finish-turning: 1000–1200 rpm

BOTTLE STOPPERS
(See *page 60*)

LET'S GET GOING WITH THE JAR LIDS

Turning a jar lid calls for gluing the blank to a wasteblock, turning a recess in the bottom, parting it off, then completing the lid on a jam chuck. A fixture that serves as both a wasteblock and a jam chuck eliminates a lot of faceplate changing. Here's how to build the two-in-one fixture.

First, trace around your 3" (or thereabouts) faceplate onto a piece of 1½"-thick stock (2× softwood lumber works great). Bandsaw the disc, then screw it to the metal faceplate. Use screws long enough to penetrate about ¾" into the wooden disc.

Mount the assembly on the lathe headstock. True the side and face with a gouge, then flatten the face with a scraper. Form a tenon tapering to a 2"-diameter face, similar to the one shown *below*.

Glue the lid blank to a wasteblock, getting it as close to centered as possible.

Mount the lid blank

Start with 1×2×2" stock. You can use practically any wood; we even laminated scraps of ¼"-thick Baltic birch plywood for one blank.

Draw diagonal lines to locate the center of the face that will be the top of the lid. Draw a 2"-diameter circle around the center. (Open your compass to 1".)

Now, glue the blank to the tenon on the lathe fixture, centering the tenon inside the circle. Woodworking

glue, epoxy, or instant glue (cyanoacrylate, or CA, adhesive) would work for this.

To attach the blank with CA adhesive, first spray a mist of accelerator on the end of the fixture's tenon. While that dries, put a few drops of gap-filling CA adhesive inside the circle on the blank. Then, press the blank onto the tenon, holding it for a few seconds while the glue cures.

Start on the bottom

With the blank glued to the fixture, slide the tailstock (with a live center installed) up to the workpiece. The tailstock adds support and minimizes the chances of dislodging the workpiece while you round it.

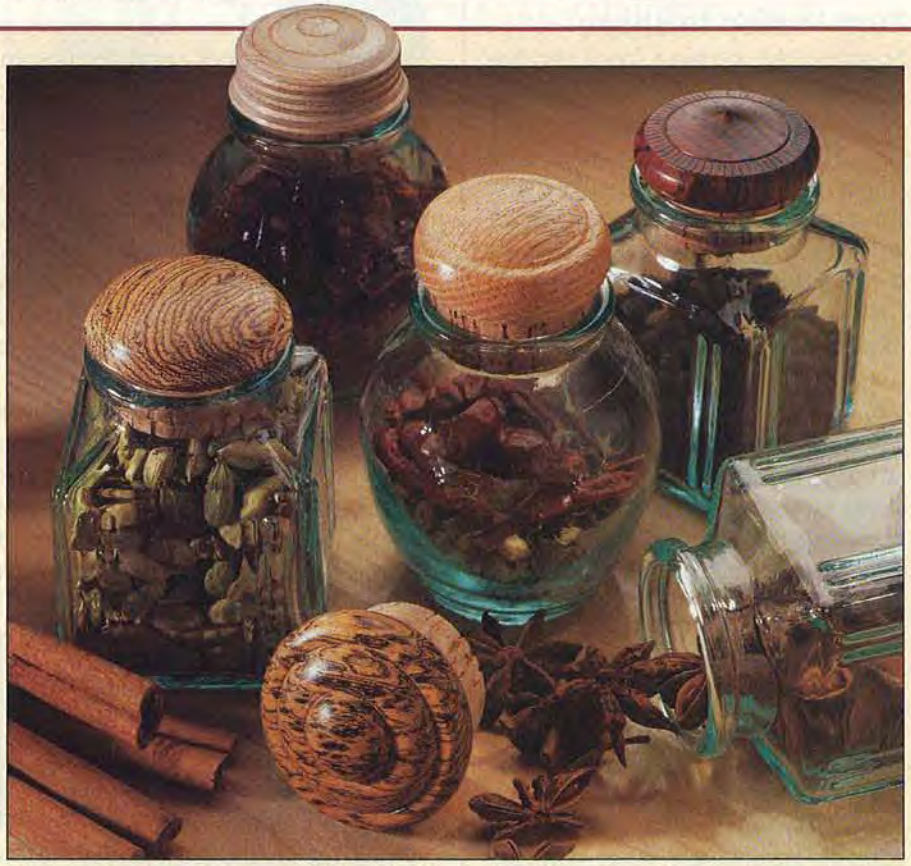
Using a gouge, turn the blank to the largest diameter possible. Then, slide the tailstock out of the way and true the blank's face with a gouge or scraper.

Measure the cork's top diameter. Draw a centered circle of that diameter on the face of the workpiece. To draw the circle easily, hold a pencil at the center of the spinning turning to make a center mark. Then, open your compass to the appropriate setting—half the circle's diameter—and lay it on the tool rest. Aim the point of the compass at the center marked on the turning, then push the pencil against the spinning turning to draw the circle.

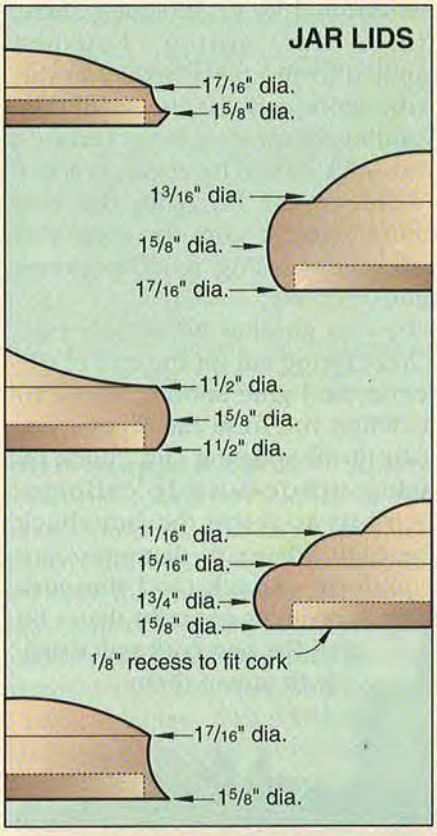
(Our corks measured 1 7/16" in diameter. Instead of setting a radius of 23/32", we went with a slightly smaller 11/16" compass opening. This allowed us to sneak up on the correct recess diameter rather than running the risk of making it too big initially.)

With a parting tool, cut in about 1/8" deep just inside the circle, as shown *above right*. Expand this groove into a recess, using the parting tool or a gouge. The cork will fit into this recess, and should fit snugly. So, taking small cuts, enlarge the recess toward the layout line. Stop frequently to check the cork's fit. When you reach the right diameter, true the recess bottom to provide a good gluing surface for the cork.

Measure the recess depth; it should be in the 1/8" to 3/16" range. If it's too deep, shave a bit off the rim with a gouge or scraper.



Establish the diameter for the cork recess with a parting-tool cut.



Continued

SHOW STOPPERS

SPINDLE-TURN THE STOPPERS

Turn the bottle stoppers employing spindle-turning tools and techniques. Before you start, though, insert the cork firmly into the flask's opening. Then, see if the height of the cork standing above the top of the bottle neck suits you.

We thought the tops would look better with less cork showing between the bottle top and the turning. So, we cut off the corks about ¼" above the bottle top, as shown *below*. Shorten yours or not, as you prefer.

Cut off the cork with a fine-toothed saw to bring the turning closer to the bottle.

To begin, locate the center on one end of a 1¼×1¼" piece of stock about ¼" longer than the height of the stopper. Drill a ⅜" hole 5/16" deep straight into the center. (Drill the hole with a drill press for accuracy.) Glue a ⅜×2½" dowel pin into the hole.

Chuck the blank

Later, the cork will fit onto the dowel to complete the stopper. But for now, that dowel makes chucking the blank easy.

For turning, you can grip the dowel in a three-jaw or four-jaw chuck or a Jacobs-type drill chuck mounted on the headstock. If you don't have one of those, a simple shop-made fixture will do the trick. Here's how to build it:

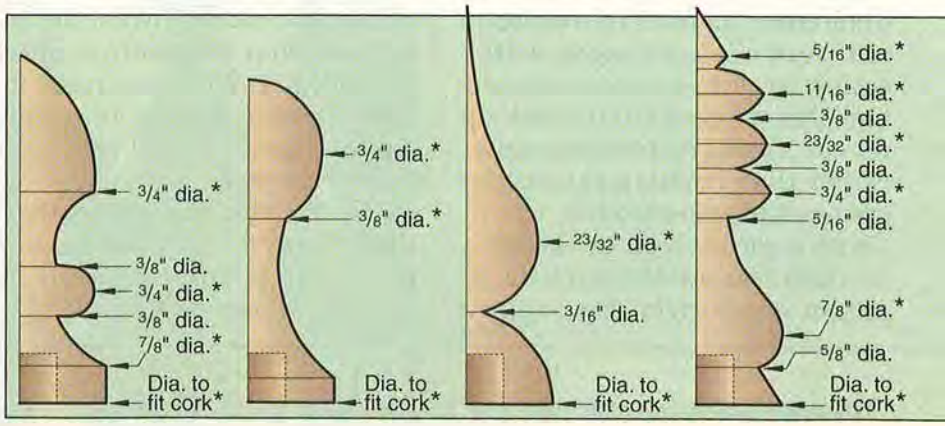
Cut a disc of scrapwood about 1½" thick to fit your lathe's 3" faceplate. Attach it to the faceplate with screws. (If you've already constructed the fixture described previously for turning jar lids, you can use that.)

Mount the assembly (or the previously constructed fixture) on the lathe's headstock. Turn the face and edge true, and find the center of the face. With the lathe running, you can find the center easily—just put a pencil point to the wood near what looks like the center. If it draws a circle on the face, you're not at the center. Keep trying until you get a point.

At that point, drill a ⅜" hole 1" to 1¼" deep straight in. You can drill it with a twist drill or a gouge. Chuck the blank by inserting the dowel into the hole. (You may have to adjust the hole size; you want the dowel to fit tightly for turning, but you also want to be able to remove the piece.)

Shape the stopper

Install a live center in the tailstock, and slide it up to engage the workpiece. Then, with a gouge, round the blank to the largest possible diameter. Cutting in from the edge with the parting



Turn the top to shape

Separate the turning from the fixture. If you attached it with CA adhesive, a sharp rap on the side with the gouge handle (or a mallet, if you insist on always using the correct tool) will often knock it loose. Otherwise, you can part it off in the usual fashion.

Now, turn the fixture's tenon to match the inside diameter of the blank's recess. This will be the jam chuck to hold the turning, so the workpiece must fit over it snugly. Reduce the diameter in small steps with the parting tool, checking the fit frequently.

Press the turning onto the jam chuck, seating it firmly so it will run true. Now, turn the top and edge profile, following one of the five designs shown or one of your own. If the turning tends to pop off the jam chuck, secure it with double-faced tape.

Sand the completed lid. (We used progressively finer sandpapers from 150- to 320-grit.) Then, finish the turning. Finishes applied to the piece while on the lathe work well for the small lids. Padding lacquer or woodturner's wax stick would be good choices.

Remove the lid from the jam chuck. Finally, glue the cork into the recess, using woodworker's glue or epoxy.

To turn another lid, simply take a light facing cut on the end of the tenon, and glue another blank to it. When you form the recess, size it to fit the existing jam chuck by using inside-outside calipers. Don't try to resize the jam chuck for each lid—cork diameters are uniform enough (and the cork itself resilient enough) that a lid that fits one cork will usually fit any of them.

tool, square the end with the dowel protruding from it.

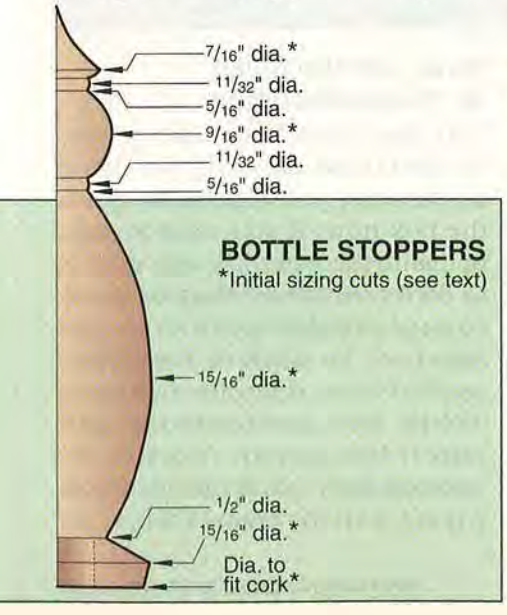
Lay out the stopper features on the blank. Here's an easy way:

Photocopy the stopper template you wish to use from the five shown *below and opposite page.* Fold it along the centerline, and lay it on the toolrest against the side of the blank. Align the bottoms of the template and blank. Then, with the lathe running, hold a pencil against the blank at each asterisked line on the template.

Determine the bottom dimension by measuring the diameter at the top of the cork. (We made some stoppers' bottoms a little larger than the cork diameter so they would overhang the corks.)

Then, with a parting tool, cut in to the specified diameter at each line and to the desired diameter at the bottom. Rough out the stopper profile, using the sizing cuts and the dimensions on the template for guidance. A small gouge and skew will do the job. Leave a connection to the waste at the top.

Finish-turn the stopper, and part off the waste at the top. Sand, and apply a clear finish. Remove the turning from the chuck, then glue the dowel into the predrilled hole in the cork. Saw off the dowel at the bottom of the cork. (We used a handsaw for safety.)



BOTTLE STOPPERS
*Initial sizing cuts (see text)

TRY THE TWIN-CRUET SET

Dress up the twin-cruet set with a pair of stoppers and a matching stand. Turn these stoppers (templates *below right*) from 1½×1½×2" stock, following the turning procedure described previously.

Turn the cruet stand

True the bottom face of a 2×5½×5½" bowl blank. Draw diagonal lines on it to locate the center. Scribe two circles around the center, one the size of your 3" faceplate and another as large as possible, but at least 5" diameter.

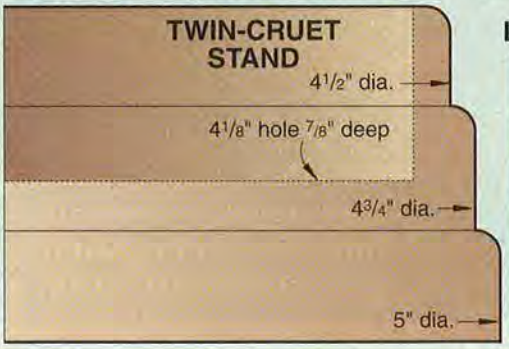
Bandsaw the larger circle. Place the faceplate inside the smaller one, and attach it to the blank with wood screws about 1" long (they shouldn't extend more than ¾" into the stock). Mount the block and faceplate on the lathe.

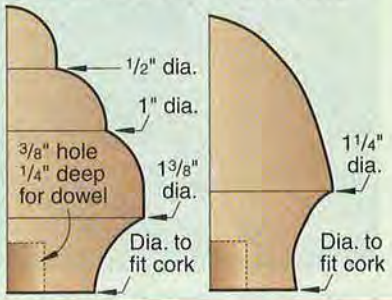
Round the blank to 5", using a bowl gouge. Reduce the thickness to 1¾" as you true the face.

Bore into the center about ⅞" deep with a ¾" gouge. Working from there, hollow out the center of the blank, forming a straight-sided, flat-bottomed recess 4⅛" in diameter. As you approach the final diameter, dismount the faceplate from the lathe. Then, check the fit of your cruet set in the recess. Remount, and adjust the depth or diameter as necessary.

Turn the outside profile, referring to the template *below.* Work from the bottom (headstock side) of the turning toward the top as you form the waterfall steps.

Sand the stand, and apply a clear finish. When dry, remove from the faceplate. Sand down the bumps created by the attaching screws. If you prefer, attach stick-on nonskid feet to the bottom of the stand or cover it with resilient material such as cork or felt.





Buying Guide

Italian glassware. Spice jars, 3", round or square, $2.95 each; bottles, 12" tall, two styles $4.95 each, one style $5.95 each; single cruet, 5½" tall, $4.95; double cruet set, 8" tall, $19.95. Cork included with each piece. Shipping extra.

Bottle corks. Bottle-stopper corks, predrilled for ⅜" dowel. Package of 10, $3; 50, $12.50. Serrated dowels also available. Shipping extra.

Bottle-stopper blanks. Square stock 1¼×1¼×2", available in ten species (bocote, cocobolo, padauk, zebrawood, Madagascar rosewood, bird's-eye maple, goncalo alves, bubinga, Amazon rosewood, and pau rosa). Package of five pieces, one species, $9.95; assortment, one piece of each species, $19.95. Shipping extra. All from Craft Supplies USA, 1287 E. 1120 S., Provo, UT 84606. Call 800/551-8876 to order, 800/398-2743 for customer service.

Photographs: Hopkins Associates Illustrations: Roxanne LeMoine; Lorna Johnson

Sun-loving Indoor

Too often, indoor potted plants don't get all the attention they deserve. You can change that, though, by building this eye-catching planter. As you can see, its height makes it perfect for placement in front of a window.

Let's start with the basic box assembly

1 Cut the planter box front and back (A), sides (B), and bottom (C) to the sizes listed in the Bill of Materials from ¾" oak plywood. See the box on *page 65* for our method of utilizing scrap plywood for this and other projects. See also the Cutting Diagram for layout reference.

2 Fit your tablesaw with a ¾" dado blade, and cut ¾" rabbets ⅜" deep along the edges of the front and back pieces (A). See the Box drawing for reference. Now, using a ⅜" dado blade, cut grooves ⅜" deep and ⅜" from the bottom end on the inside face of the front, back, and side pieces (A, B).

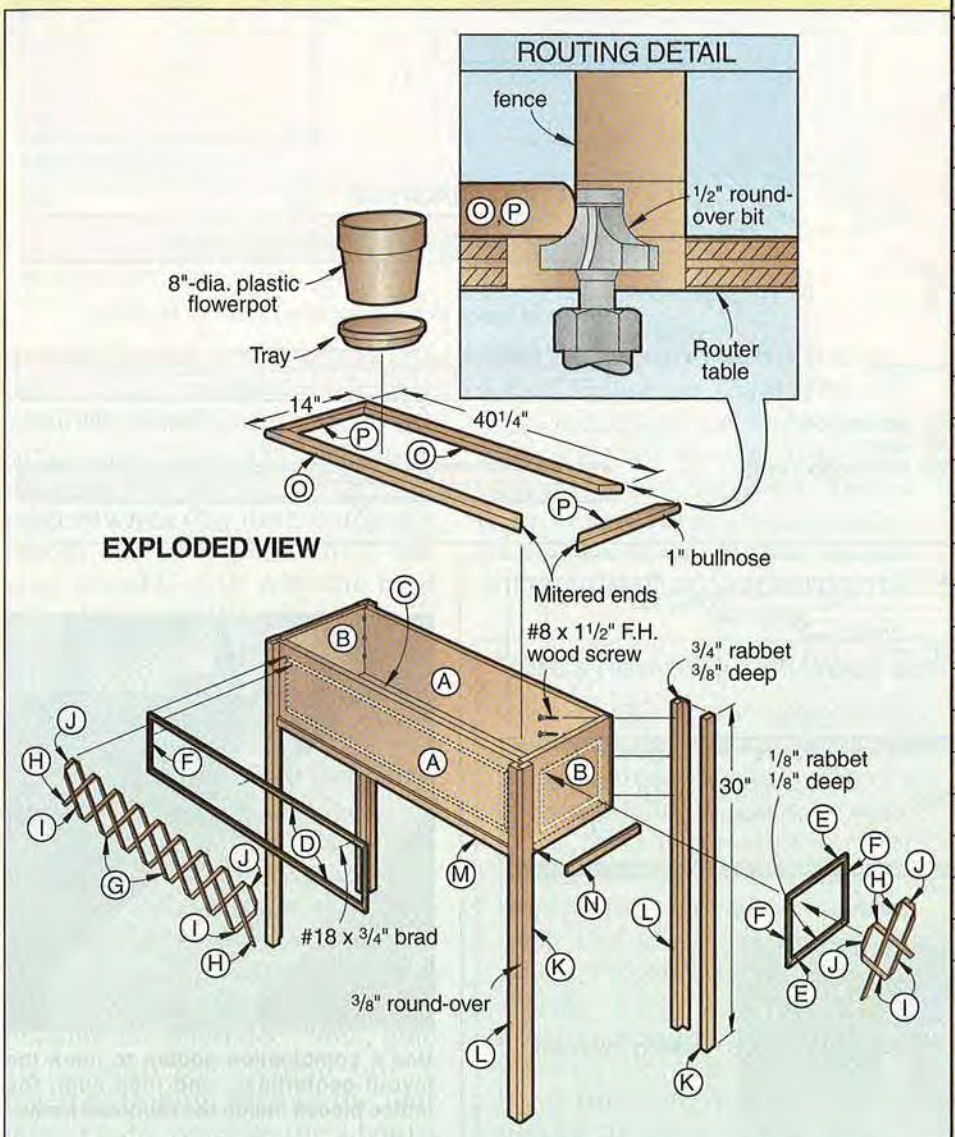
3 Cut a ⅜" rabbet ⅜" deep along the bottom edges of the bottom panel (C).

4 Dry-clamp the plywood pieces together to check the fit. Adjust if necessary, then glue and clamp the box pieces together, checking for square. Later, remove the clamps, scrape off excess glue, and sand smooth.

Now, add the finish to the plywood box

1 If you want the same whitewashed finish on your plant stand as on ours, you'll need to finish the box now. If you want to stain or paint the box, it's also easiest to do it now before the lattice surround and lattice pieces are attached. To achieve the whitewashed look, dilute two parts of interior latex paint with one part water. Use a cloth to wipe the watered-down paint on the wood, wiping with the grain. Then, use a

planter



Bill of Materials

Part	Finished Size T	W	L	Matl.	Qty.
BOX					
A front & back	¾"	37½"	8½"	OP	2
B sides	¾"	10½"	8½"	OP	2
C bottom	¾"	36¾"	10½"	OP	1
LATTICE SURROUND					
D* frame	¼"	½"	33⅝"	O	4
E* frame	¼"	½"	7 21/32"	O	4
F* frame	¼"	½"	5 13/16"	O	8
LATTICE					
G* strips	⅛"	⅜"	7 1/16"	O	28
H* strips	⅛"	⅜"	7 5/16"	O	8
I* strips	⅛"	⅜"	4 15/16"	O	8
J* strips	⅛"	⅜"	2¼"	O	8
LEGS					
K* legs	¾"	1⅛"	30"	O	4
L* legs	¾"	1½"	30"	O	4
BOTTOM AND TOP TRIM					
M trim	¾"	½"	36"	O	2
N trim	¾"	½"	9¾"	O	2
O trim	¾"	2¼"	40¼"	O	2
P trim	¾"	2¼"	14"	O	2

Length is measured with the grain.
* Initially cut parts oversized. Then trim each to finished size according to the how-to instructions.

Materials Key: OP–oak plywood, O–oak

Supplies: #18×¾" brads, #8×1½" flathead wood screws, white latex house paint, oil-based enamel, clear finish.

clean, damp cloth to immediately wipe off most of the paint mixture. (We tried this on a piece of scrap plywood first to get the hang of it.)

2 After the paint has dried, lightly sand the surfaces of the plywood box with 220-grit sandpaper to bring back as much of the wood grain and color as desired. If you lose too much of the white-washed effect, you can always wipe on and rub off some more of the paint mixture.

Cut and nail on the lattice-surround pieces

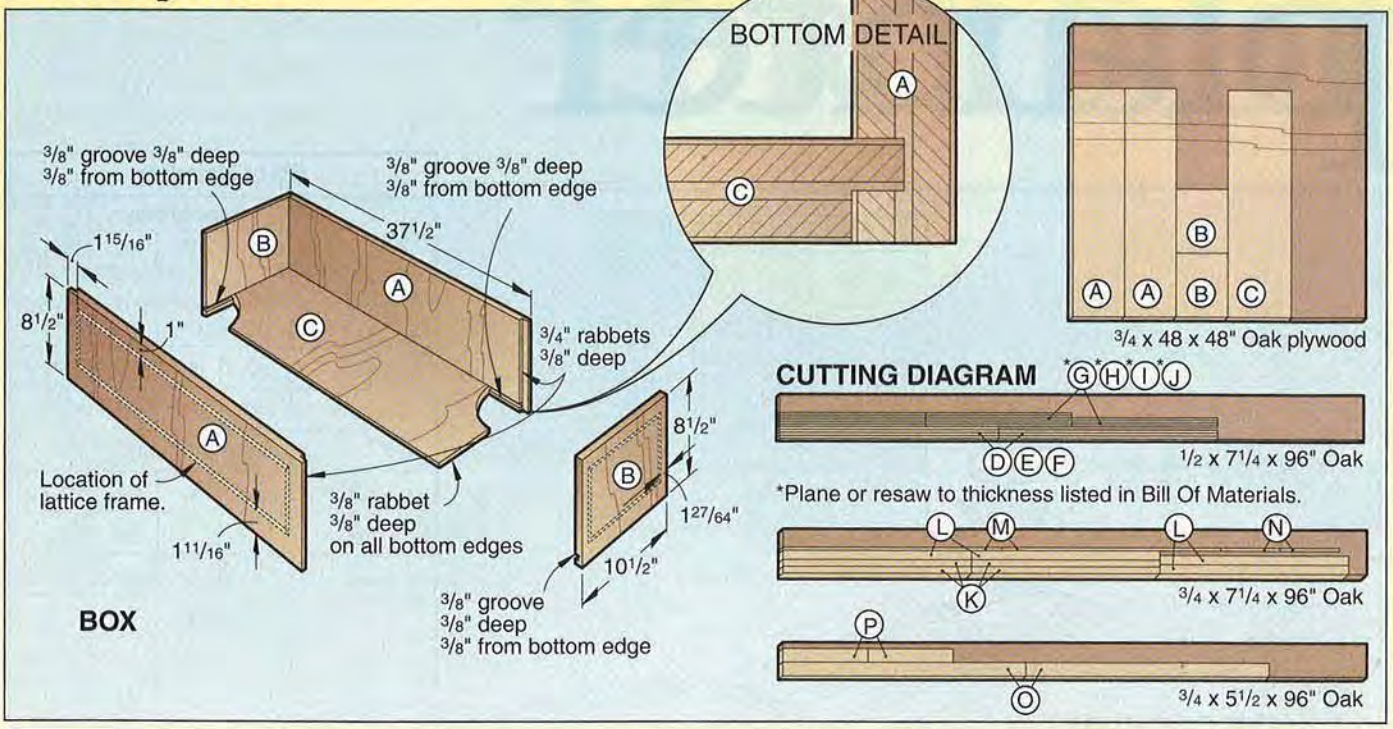
1 From ½" oak stock, rip seven pieces from the edge to ¼" wide by 36" long for the ¼×½" lattice-surround strips (D, E, F).

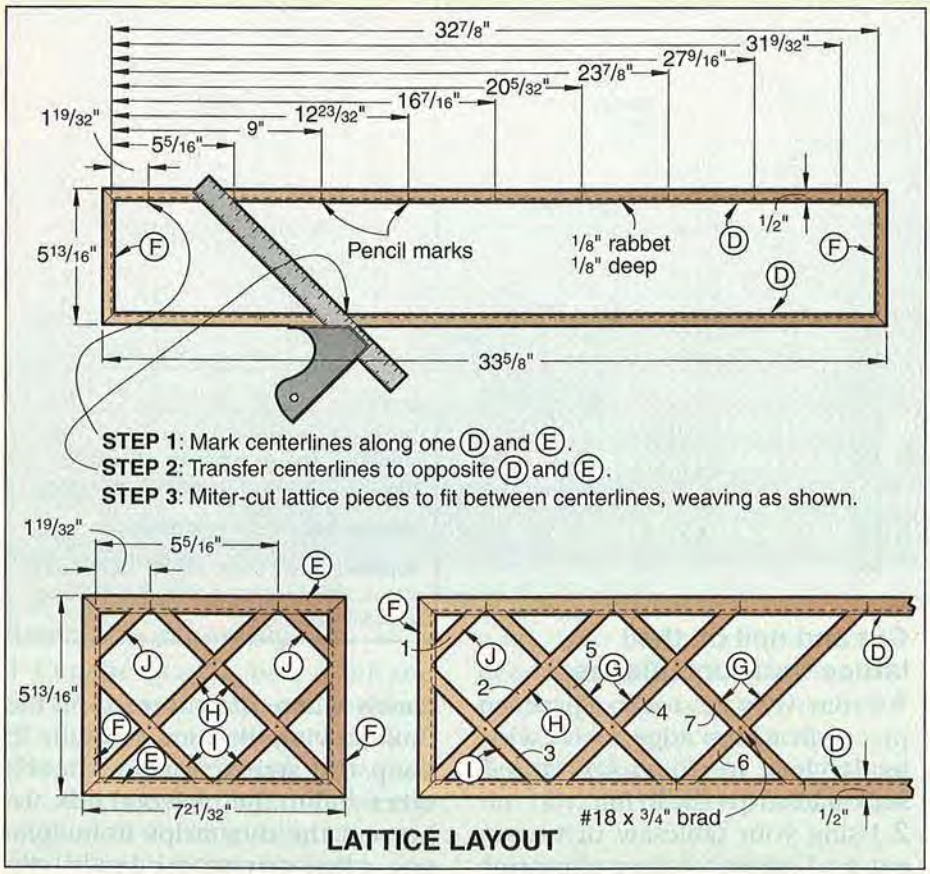
2 Using your tablesaw or router, cut a ⅛" rabbet ⅛" deep along one edge of each 36"-long strip.

3 Miter-cut the lattice-surround pieces (D, E, F) to length from the 36"-long strips. Sand the pieces smooth. Then, nail each surround piece to the front, back, and side panels where dimensioned on the Box drawing. Position carefully to keep the strips square to each other and to the plywood box. To prevent the thin strips from splitting when driving the brads, clip the head off one of the brads, and chuck the brad into your drill press. Use the brad as a bit to drill pilot holes through the surround pieces.

Continued

Indoor planter





Use a combination square to mark the layout centerlines, and then align the lattice pieces inside the rabbeted frame.

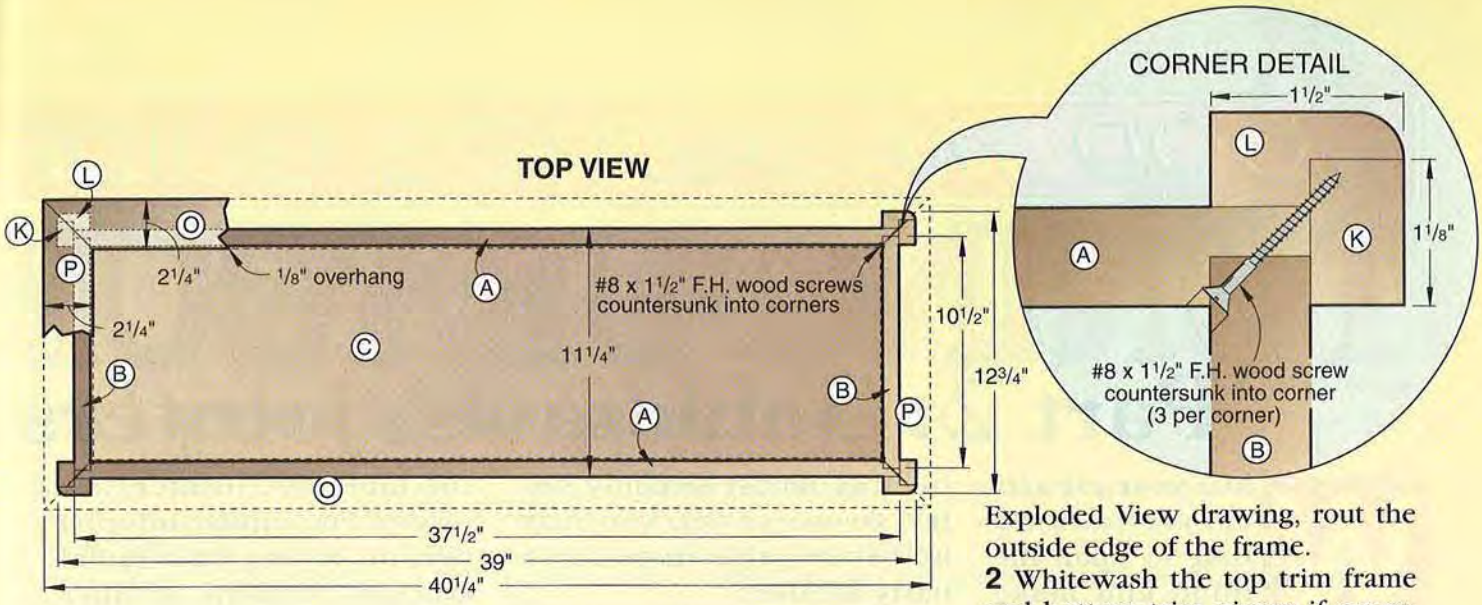
It's time to add the lattice

1 Rip 1/8" strips from the edge of 3/8" stock. (We planed thicker stock, and then cut 16 pieces measuring 1/8×3/8×24" each.) You'll use these for the lattice (G–J).

2 Sand the strips smooth. Use the previously stated procedure to whitewash each strip. Let the strips dry. Then, miter-cut one end of each strip.

3 Apply masking tape to the top and bottom pieces of the lattice surround (D, E) on each of the four frames where shown in the photo *above*. The masking tape allows you to make all your pencil marks for positioning the lattice strips now. Then, you simply peel off the tape later to remove the pencil marks.

4 As noted on the three-step drawing, mark the centerlines, then weave and nail the pieces in place in the order marked on the



drawing and as shown in the photo. Use a combination square as shown in the photo to keep the lattice pieces at a 45° angle from the top and bottom surround pieces. When you have the lattice pieces correctly positioned, use your portable drill with the brad pilot bit to drill a pilot hole at each point where two pieces cross. Drive the brads. The short pieces (J) are just glued in place.

Add the legs to raise the box to window level

1 From ¾" stock, cut the leg parts (K, L) to size plus 1" in length.

2 Cut a ¾" rabbet (or the same exact thickness as your stock) ⅜" deep along one edge of each L piece. See the Exploded View drawing for reference. Now, glue and clamp one K and one L together to form each of the four legs. Later, remove the clamps and crosscut the legs to length.

3 Rout a ⅜" round-over along the outside edge of each leg. See the Exploded View drawing for reference. Sand the four legs smooth, and whitewash them if desired.

4 With the top ends of the legs flush with the top edges of the planter box, glue and clamp the legs in place. Drill three countersunk mounting holes on the inside of the box at each corner, and drive screws through the box and into the legs to further secure the legs to the box.

Add the top and bottom trim

1 Cut the bottom trim pieces (M, N) to size. Then, cut the top trim pieces (O, P) to size. Glue and clamp the top four trim pieces together to form a rectangular frame. Now, as shown on the Routing detail accompanying the Exploded View drawing, rout the outside edge of the frame.

2 Whitewash the top trim frame and bottom trim pieces if necessary, and then glue and clamp them in place. See the Top View drawing for reference.

3 Apply three coats of clear finish (we used Deft Semi-Gloss Lacquer) over the whitewashed finish. Paint the inside of the box with an oil-based enamel paint.

Here's how to put plywood scraps to good use

If you're like most woodworkers, you've got pieces of plywood lying around your shop. Here's what we did to use some of ours.

To form the panels for our planter, we cut the narrow strips of plywood to length (measured with the grain) plus 1". Then, as shown in the photo *at right*, we edge-joined the individual pieces, using C-clamps at each joint to keep the surfaces flush. We didn't use biscuit joints or splines on our panels. If you're using the plywood in a situation where strength is important, use either. Later, we removed the clamps and trimmed the top and bottom ends to obtain the 8½" final length.

Cut long, narrow pieces of scrap plywood into shorter pieces. Then, carefully edge-join the individual pieces to form wider, more usable panels.

Written by Marlen Kemmet Project Design: James R. Downing Illustrations: Roxanne LeMoine Photographs: Hopkins Associates

WOOD® MAGAZINE'S GUIDE

TUNING UP YOUR

Part 2: Tablesaws, jointers,

When your car acts up, you know it's time to open the hood and make some adjustments. Likewise, if you don't keep your power tools in tune, the quality of your woodworking will almost certainly suffer. Or worse yet, you may be setting the stage for a nasty accident.

To prevent such occurrences, and to maximize precision performance from your tools, we've developed a trustworthy guide to keep your major power tools in tip-top shape. Here, we look at three shop stalwarts: the tablesaw, jointer, and planer. For similar information on tuning up a radial-arm saw, bandsaw, or miter-saw, see the October 1995 issue of *WOOD*® magazine.

Start by gathering up your tune-up tools

You probably already have all or most of the basic tune-up tools: 8" and 12" plastic drafting triangles, a 4' level or aluminum rule, a set of SAE or metric wrenches (depending on the type of screws

TO POWER TOOLS and portable planers

and bolts used on your machine), spring or C-clamps, a few shingle shims, and several pieces of scrap stock. You'll also need a set of feeler gauges for checking clearances. You can buy these pocket-size sets of thin metal blades in .001" increments at auto-parts stores and some hardware stores. These sets cost only a few dollars each, so it's a good idea to have an extra set or two for use as precision shims, too.

That's the low-tech list. For greater precision, consider investing in a dial indicator, such as the A-Line-It (shown in the photo *left*). It's available for $139.95 ppd. from In-Line Industries, 661 S. Main St., Webster, MA 01570. Call 800/533-6709.

A dial indicator measures dimensional differences as small as .001"—about one-third the thickness of a human hair. Accessories that come with the A-Line-It let you configure the indicator to perform many different tasks on several machines.

For tuning up a tablesaw, or any other saw that uses a 10" circular blade, you also might want to purchase a calibration plate like the one shown in the photo *below right*. These are precision-ground blades with no teeth to get in the way of your measurements. A calibration plate also doubles as a disc sander. You can order a 10" "Set and Sand" Disc from CMT for $24.90 plus shipping (call 800/531-5559), or a 10" "Calibration and Sanding Disk" from Freud dealers ($38 list). Call 800/472-7307 for a nearby dealer.

To take some of the tedium out of setting the knives on a jointer, consider a magnetic setting tool such as the Magna-Set ($27-$70 depending on model, plus shipping, from Grizzly Imports. Call 800/523-4777 east of the Mississippi river, 800/541-5537 west of the Miss-issippi). We show and tell you more about these high-tech tools on the pages that follow.

Next, do a quick inspection of moving components

Before you tune up any machine, examine its belts, pulleys, and bearings. Check belts for cracks, fraying, and wear. If the top of a belt is more than ⅛" below the edge of the pulley, replace it.

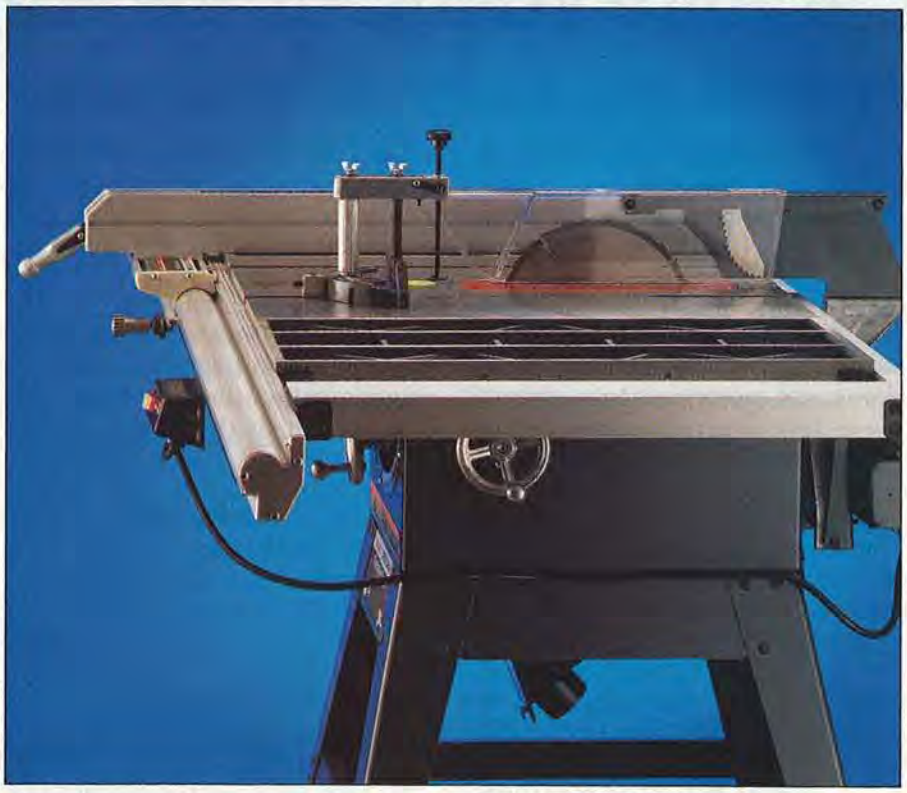
Even if the belt looks okay, remove it and inspect the pulleys. Look for a shallow groove on the pulley's inside bevel, where the belt makes contact. If you can feel a ridge between this groove and the portion of the pulley that does not contact the belt, replace the pulley. Worn pulleys shorten the life of your belts and bearings, and sometimes cause annoying vibration as well.

Finally, before you reinstall the belt, spin all bearings. They should turn smoothly and silently, with no detectable back-and-forth movement. A dial indicator can tell you the precise amount of movement. It should be 0. Up to .001" is acceptable, but keep an eye on them because any play at all causes bearings to wear faster.

Continued

TABLESAWS

As the workhorse in most woodworking shops, the tablesaw gets more use than any other stationary power tool. Properly tuned, it's also one of the most accurate machines you'll ever operate. Timely tune-ups ensure cuts that are right on the money—and promote safety by eliminating most of the causes of dangerous workpiece kickbacks.



Getting to know your saw

Tablesaws fall into three general categories: direct-drive saws, contractor's saws (pictured *right*), and cabinet saws. No matter what type you own, we'll show you how to get top performance from it. Here are the key differences between the three types:

With direct-drive saws, the arbor is mounted on the motor shaft; there are no belts or pulleys. Most direct-drive saws are lightweight bench-top models.

With a contractor's saw, the motor mounts out behind the saw and drives the arbor with a single belt. A contractor's saw bolts to a lightweight frame and can be readily relocated from one part of a job site to another.

Cabinet saws connect the motor to the arbor via two or three belts and pulleys. These powerful heavyweights are a good choice for a saw that never leaves the workshop.

A few opening procedures

Begin your tune-up by unplugging the saw. Remove the blade so the blade, arbor flange, blade washer, and arbor threads can be thoroughly cleaned and inspected. (If you're not sure about the position of these parts, see the Aligning the Drive Pulleys drawing on the *opposite page*.) Now, rub the blade washer and nut lightly across a sheet of 320-grit abrasive mounted to a flat surface such as a piece of plate glass. Any burrs or high spots will show up as bright, shiny areas. These should be flattened with emery cloth or a whetstone.

Also check the blade's arbor hole, using a finger to feel for burrs. Remove any you find with a small whetstone. The same goes for any nicks or burrs you detect on the arbor flange.

Finally, if yours is a contractor's saw, check and tighten all of the stand's nuts and bolts. Snug them up for rattle-free performance.

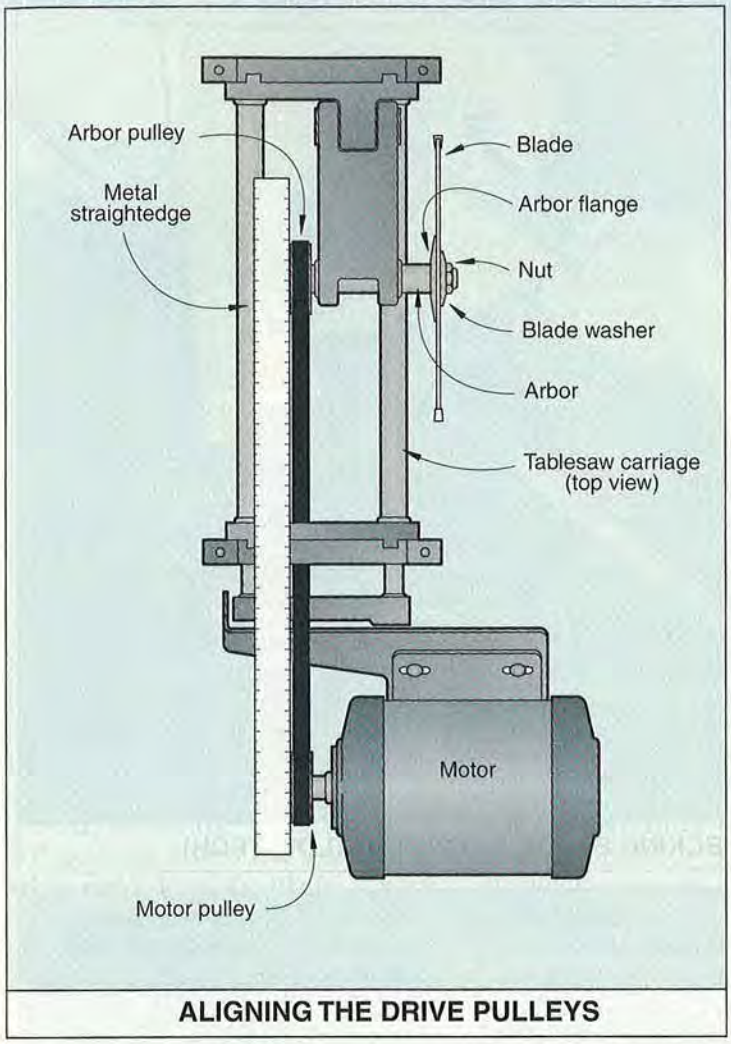
The nine steps to a perfectly tuned tablesaw

Now you're ready to get that saw in tune. Because each of these adjustments depends on the one that goes before it, make them in the order described here.

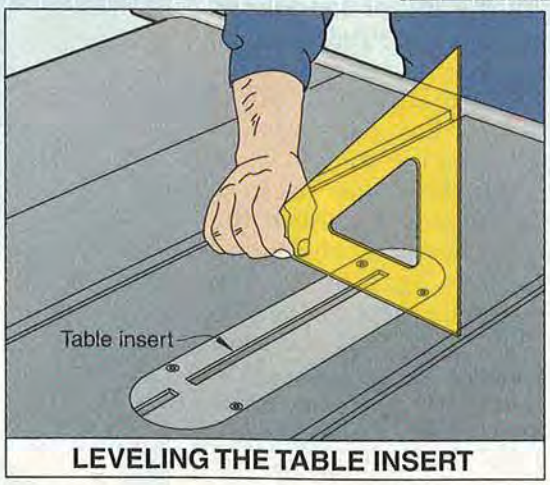
1 Align the drive pulleys

If you have a direct-drive saw, you obviously can skip this step. Multi-belt cabinet saws rarely go out of alignment, either. But contractor's models, which have a motor that hangs from the back of the saw with a long belt, are prone to vibration that transmits directly to the blade.

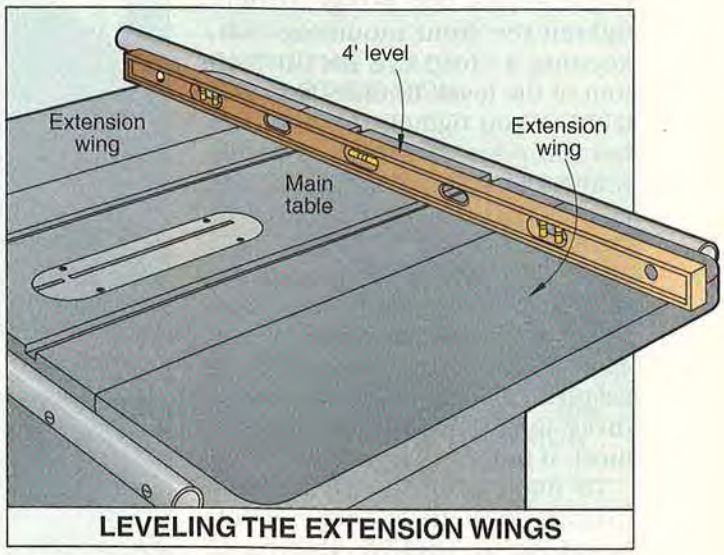
First, check the motor's pivoting base. Its job is to tension the belt, and the pivot should only be free enough to let the motor swing downward as the blade lowers



ALIGNING THE DRIVE PULLEYS



LEVELING THE TABLE INSERT



LEVELING THE EXTENSION WINGS

and upward as it rises.

Now, if space permits, lay a straightedge against the outer edges of the arbor pulley and motor pulley as shown in the drawing *above*. If both sides of each pulley touch the straightedge, the pulleys are in alignment. If one or more points of the pulleys don't make contact with the straightedge, adjust the motor or pulleys until the straightedge lies flush against both pulleys.

If you can't maneuver a straightedge into your saw, you'll have to align the pulleys by eye. Crouch behind the saw so you can sight along the belt and pulleys with your dominant eye. (Close the other one.) Once they're aligned properly, be sure to tighten up the pulleys or motor mount.

2 Level the table insert

Now check that the table insert fits flush with the tabletop. Most inserts have four leveling screws at the corners. Turning these screws raises or lowers the insert. If your saw's insert doesn't have leveling screws, you may have to file the underside of the insert to lower it, or use layers of masking tape to raise it.

Use an 8" drafting triangle to determine if the insert is flush. With a triangle, stand it on edge at 90° to the miter slot. First, bridge the insert at the front edge, and raise or lower the insert until it touches the triangle. Move the triangle to the rear and do the same. Finally, slide the triangle over the entire insert. If you feel it catch, lower the insert some more.

3 Level the extension wings

For accurate cuts and controlled handling of large workpieces, your tablesaw's extension wings should be perfectly flush with the table. Check this with a 4' level as shown *above*.

If they're not flush, you'll need the level, a fine file or 220-grit sandpaper, a spring or C-clamp, and a set of feeler gauges you can use for shims.

Begin by removing the wings

Continued

and, with the file or sandpaper, gently radiusing the top edges of the saw table and wings. This removes sharp edges and burrs. Also sand off any paint on the mating edges of the wings.

Now, bolt the wings back on the saw, but don't tighten the bolts all the way. Let the wings sag, with a 1/16" gap at the top where the wings meet the table.

Place the level across the front edge of one wing and the tabletop. Clamp the level to the extension wing at the outer edge. Pushing the level flat against the table aligns the wing. Slowly tighten the front mounting bolt, keeping a close eye on the bottom of the level. If it lifts from the table as you tighten the bolt, the bottom edge of the wing needs shimming; if a gap appears at the center of the level, you need to shim the top edge.

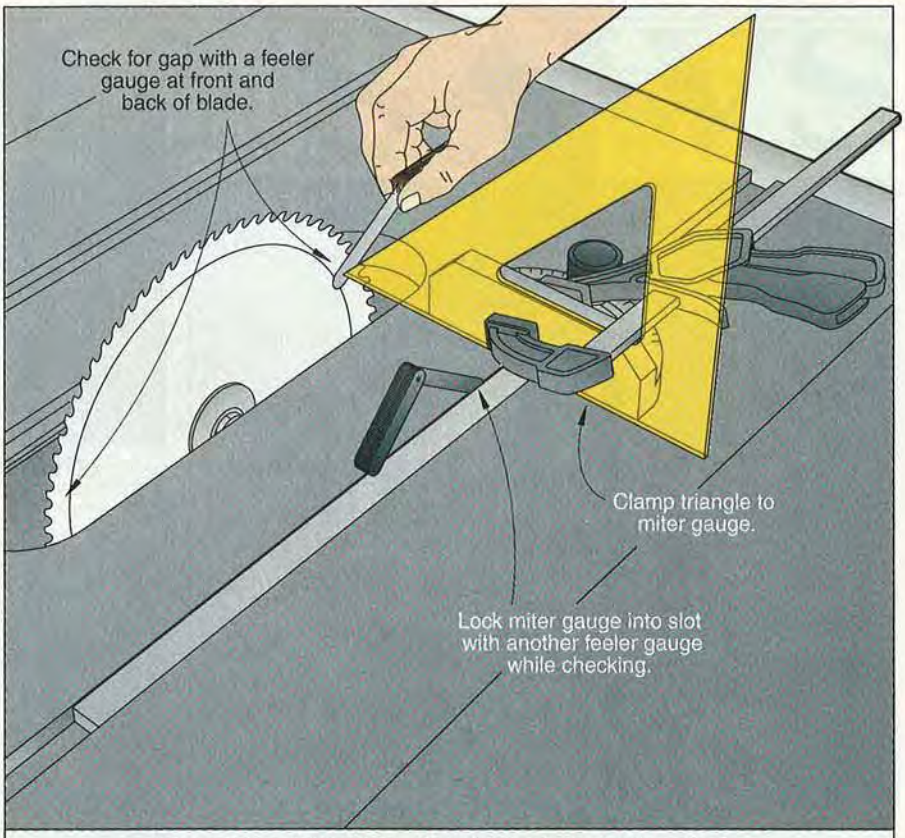
Check at a minimum of three points along each table edge. You need to do this because wings can bow along their length (even cast-iron ones). By shimming at three locations you can remove most, if not all, of any bow.

To make shims, insert feeler gauge blades one at a time directly above or below the bolt. Tighten and check the alignment. It may take some trial and error to find the right thickness. Once you do, cut enough 1/4"-long pieces of the blade to fit above or below all the wing bolts. Repeat this process with the other wing.

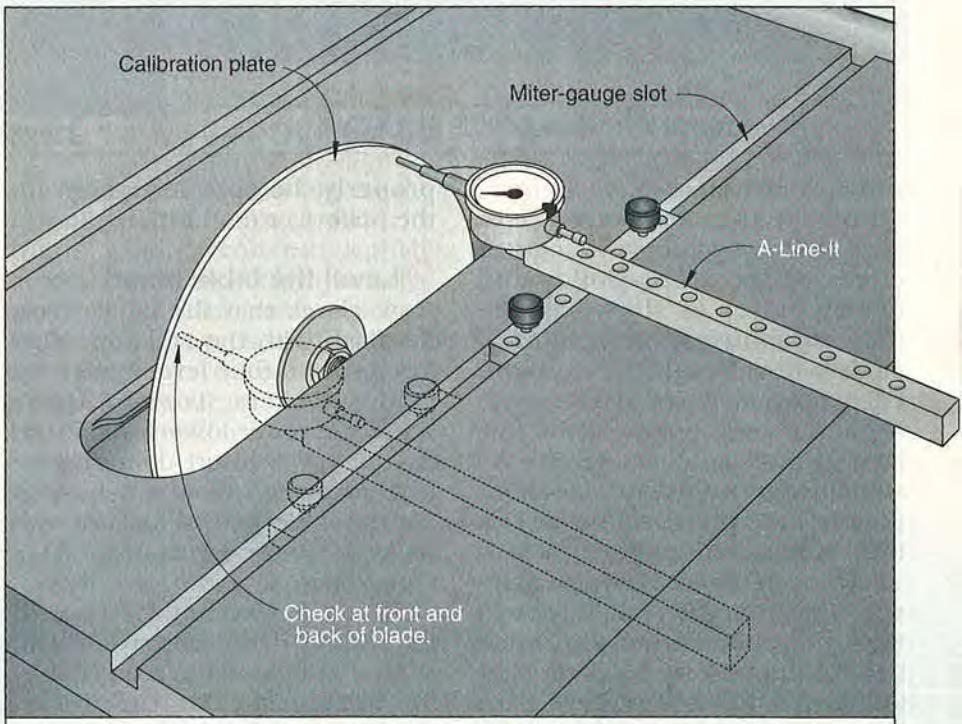
4 Check the blade for alignment with miter slots

For a saw to accurately crosscut and rip, its blade must precisely parallel the miter slots. A misaligned blade will force work into or away from the blade, causing burning or kickbacks.

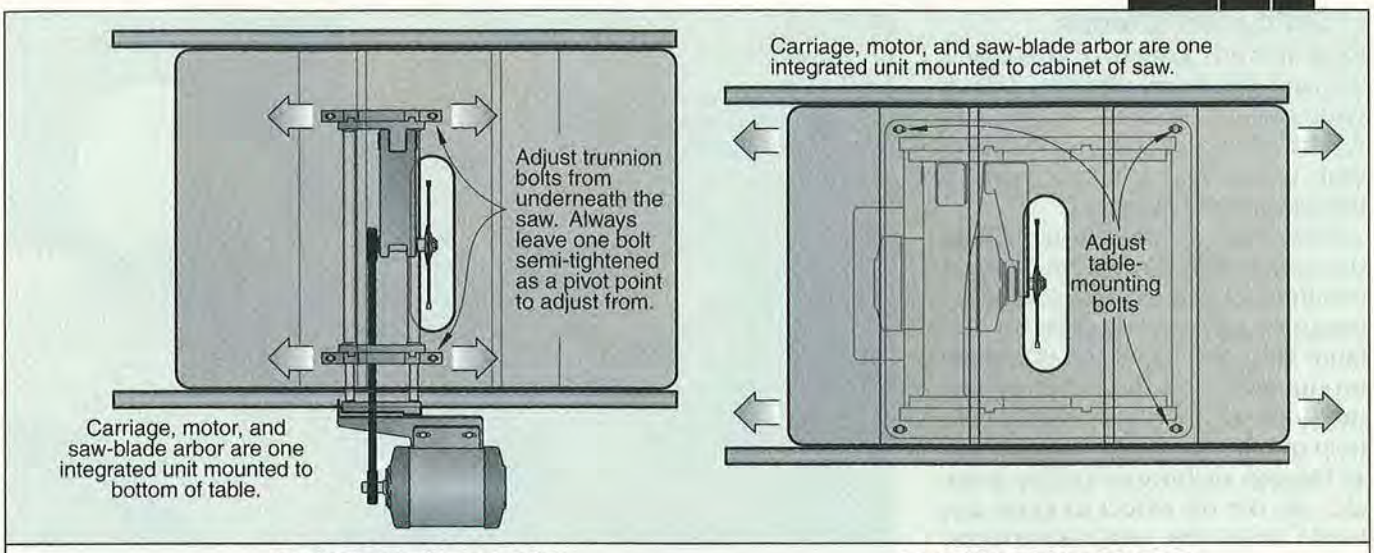
To check your blade's alignment, remove the guard and splitter, and install your best blade or a calibration plate.


Check for gap with a feeler gauge at front and back of blade.
Clamp triangle to miter gauge.
Lock miter gauge into slot with another feeler gauge while checking.

CHECKING BLADE ALIGNMENT (LOW-TECH)



CHECKING BLADE ALIGNMENT (HIGH-TECH)


Adjust trunnion bolts from underneath the saw. Always leave one bolt semi-tightened as a pivot point to adjust from.
Carriage, motor, and saw-blade arbor are one integrated unit mounted to bottom of table.
Carriage, motor, and saw-blade arbor are one integrated unit mounted to cabinet of saw.
Adjust table-mounting bolts

ALIGNING THE BLADE (CONTRACTOR-STYLE SAW)

ALIGNING THE BLADE (CABINET-STYLE SAW)

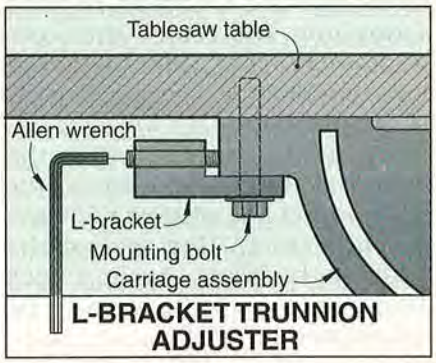
Raise the blade or calibration plate to the top of its travel, then lower it slightly. (We've tuned many saws that slightly skew the blade at its topmost setting, which can throw off your settings.)

Next, adjust the miter gauge to 90°, and set it into the slot on the arbor nut side of the blade. If your miter gauge fits sloppy in the slot, use feeler gauges to shim it snugly against the side of the slot nearest the blade.

Mark a reference point on the blade just below the teeth or gullets, and rotate the mark to the front of the table. Now, stand an 8" drafting triangle against the miter gauge, with the point lined up with the mark on your blade. Lock the miter gauge in place, slip a .010" feeler gauge between the triangle's point and the blade, take up all play, and clamp the triangle to the miter gauge.

The feeler gauge should slide in and out without deflecting the blade. Remove the feeler gauge and rotate the blade mark to the rear. Slide the miter gauge to the rear—again lining up the point of the triangle with the mark on the blade—and lock the miter gauge in place. The same feeler gauge should fit. If it doesn't, try others until you determine how far your blade alignment is off. If it's more than .002", determine which direction the back of the blade needs to go.

The illustration *opposite page, bottom,* shows a "high-tech" way of checking blade alignment with a dial indicator. Instructions packed with the A-Line-It explain how to read a dial indicator.



L-BRACKET TRUNNION ADJUSTER

5 Align the blade parallel with the miter slots

Exactly how you get the blade into alignment varies somewhat, depending on the type of saw you have. Direct-drive and contractor saws have a pair of trunnions bolted to the bottom of the table. To align these, you loosen the trunnions and shift them to one side or the other as shown *above left.* We find it easier to move the rear trunnion assembly. Leave one of the front bolts semi-tightened and use it as a pivot.

Using a piece of stock and a hammer, gently tap the trunnion in the direction you want to move it. For greater control over this adjustment, you also can shift the trunnions with an L-bracket trunnion adjuster like the one shown *above.* This "Precision Alignment & Locking System (PALS)" is available for most tablesaws for $19.95 ppd. from In-Line Industries at the address on *page 67.*

When the same feeler gauge can be inserted at the front and rear of the blade, the blade is parallel and the bolts can be tightened. After tightening them, check one more time to make sure the trunnion didn't move.

With cabinet saws, the trunnions and table are independently bolted to the cabinet, making adjustments easy. With these, loosen three of the table-mounting bolts as shown *top right,* and tap the table into alignment with a mallet or hammer and a block of wood.

Continued

6 Set the bevel stops

Built-in stops govern a tablesaw's 90° and 45° bevel settings. Check your owner's manual to find out where these stops are located, then use an 8" triangle to learn if they're accurately set.

First, raise the blade or calibration plate just shy of its highest position. Check the 90° setting by positioning the triangle on the table with one leg of the 90° angle on the table and the other against the body of the blade, taking care to avoid the teeth. If you see a gap at the top or bottom of the triangle, use the tilt wheel to move the blade until the gap disappears. Unlock the 90° stop, bring it into contact with its matching point on either the trunnion or lead screw nut, and relock the stop. With the triangle, double-check that the blade remains at exactly 90° to the table.

Set the 45° bevel stop in the same way, tilting the blade to the 45° position and placing the triangle with its 45° leg against the body of the blade. Again, check after you relock the stop to be sure it hasn't shifted.

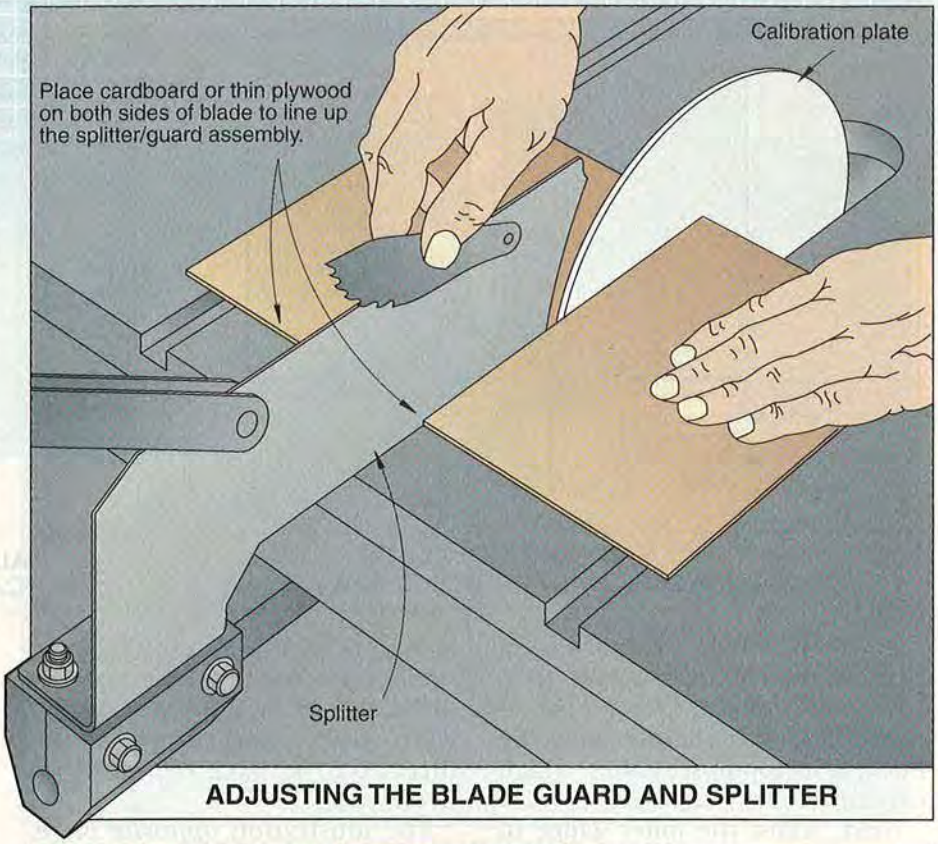
7 Adjust the blade guard and splitter

To do its job properly, the splitter must remain parallel with the saw blade, in the middle of the kerf. To set the splitter, cut a thin piece of cardboard or plywood in half, place the pieces against both sides of the blade or calibration plate, and center the splitter.

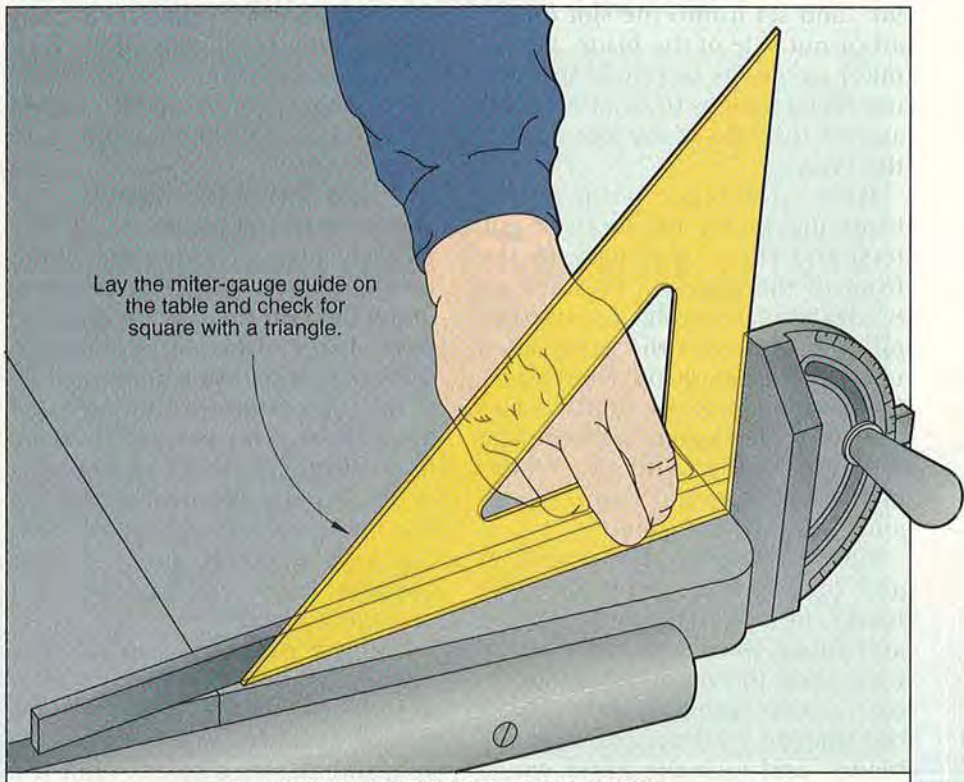
8 Set the miter gauge

For accurate cuts, check your miter gauge often. Place it on a flat surface, such as your saw's table, and use the 90° angle of a triangle to determine if the gauge is square, as shown *right.*

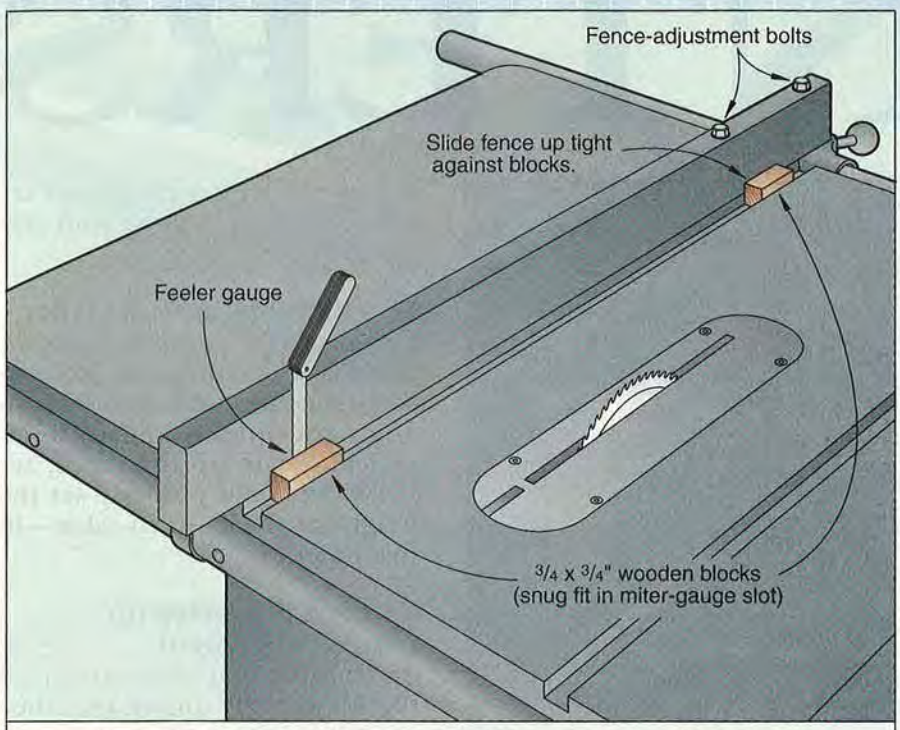
To set the 45° left and right angles, use the 45° edge of the triangle to establish and lock in your miter settings.


Calibration plate
Place cardboard or thin plywood on both sides of blade to line up the splitter/guard assembly.
Splitter

ADJUSTING THE BLADE GUARD AND SPLITTER



SETTING THE MITER GAUGE

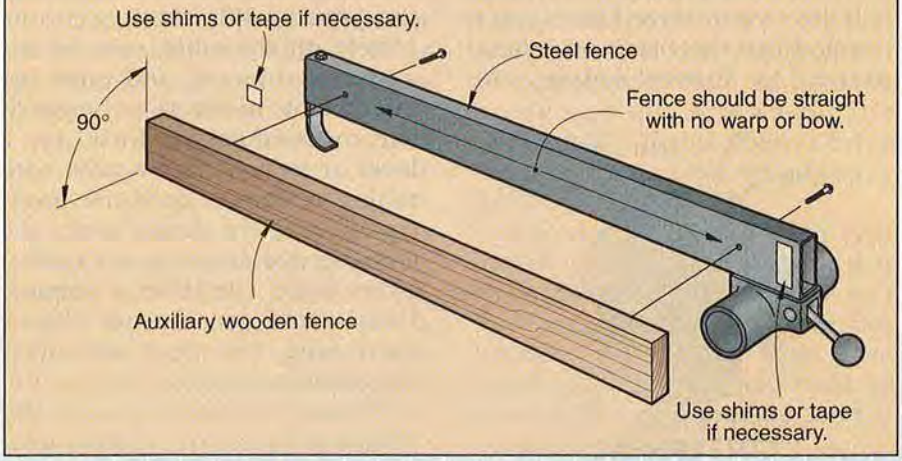

Fence-adjustment bolts
Slide fence up tight against blocks.
Feeler gauge
3/4 x 3/4" wooden blocks (snug fit in miter-gauge slot)

ALIGNING THE FENCE WITH THE MITER-GAUGE SLOT

How to straighten a warped tablesaw rip fence

Many stamped-steel fences tend to warp—and no amount of adjusting will compensate for a fence that's bowed or twisted along its length, or doesn't sit at a precise 90° angle to the table. Check your fence by holding a straightedge against it. Also, use the triangle to learn if the fence is 90° to the table.

If you spot any gaps between the fence and the straightedge or triangle, install an auxiliary fence as shown *below*. Select a stable board that's flat and straight, cut it to size, and drive screws into the wood through prepunched holes in the steel fence. True up the auxiliary fence with paper or tape shims.


Use shims or tape if necessary.
Steel fence
Fence should be straight with no warp or bow.
90°
Auxiliary wooden fence
Use shims or tape if necessary.

9 Align the fence

Kickbacks, excessive sawdust, burnt cuts, and crisscross saw marks are all symptoms of an improperly aligned fence. But properly aligned, you might be surprised to learn, doesn't always mean that the fence should be set precisely parallel to the blade. Instead, for safe, burn-free ripping cuts, we recommend setting your fence .015" to .030" open at the rear. This prevents work from binding between the blade and the fence if the wood warps as you rip it.

The big trick to aligning a fence is keeping it that way, which means you should probably realign it before every major cutting project. To make this an easy adjustment now and in the future, rip a 4"-long, ¾"-thick hardwood block to the width of your miter slot. Then, cut this piece in half to get two 2"-long blocks.

To align the fence, fit these blocks into the miter slot at the front and rear edges of the table. Loosen the bolts that adjust parallelism, drop the blade beneath the table, and slide the fence against both blocks.

At the rear, start with a .015" feeler gauge between the fence and block. With the fence pushed firmly against the block at the front and the block and feeler gauge at the rear, lock the fence head. Retighten the alignment bolts on the fence.

Now remove the blocks, plug in the saw, and rip a test cut. Inspect the fence side of the ripped edge for burns and crisscross saw marks. If you find any, add a little more space between the fence and blade. If you need to add .030" or more space, replace the blade and recheck.

(If you are getting less-than-clean cuts with a dado blade, reset your fence parallel with the blade. Just open it up again for ripping.)

Continued

JOINTERS

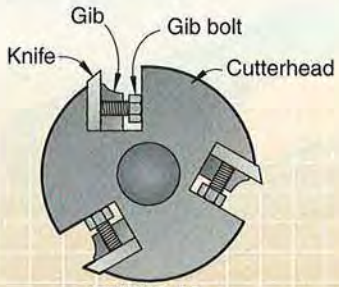
Except for the tablesaw, you may use the jointer more than any other machine in the shop. A jointer requires fewer adjustments than a tablesaw—just three or four, depending on the design of your machine. But they're critical if you want to mill stock that's perfectly straight and square.

How your jointer works

Think of a jointer as a motorized hand plane turned upside down. In place of the hand plane's sole, jointers have a pair of tables that support the stock as you pass it over a rapidly turning cutterhead.

Down below, an elevation wheel provides a means for adjusting the height of the infeed table, and many jointers have a control for the outfeed table as well. Machined dovetail ways align and guide the tables. You can fine-tune their alignment and lock them in place with accessible gib screws.

The cutterhead itself consists of a cylindrical assembly that typically holds two or three knives, each beveled like the blade on a hand plane. As shown *below*, the knives of a typical cutterhead are tightly wedged in place with gibs and gib bolts.



TYPICAL CUTTERHEAD

Five surefire tune-up tactics

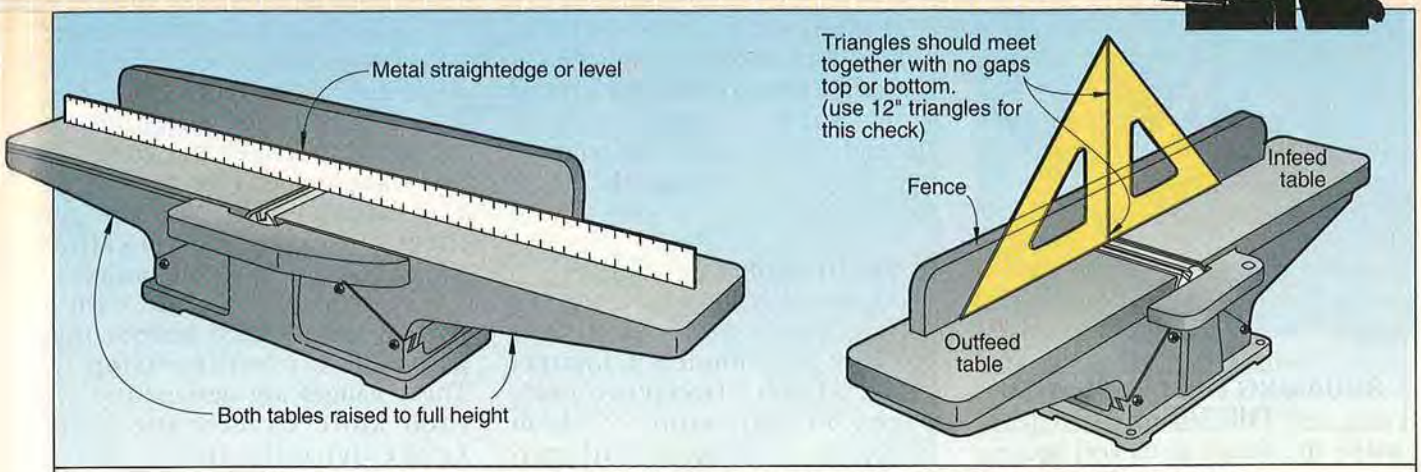
To guarantee yourself a jointer that makes smooth and accurate cuts time after time, you need to align the infeed and outfeed tables, square up the fence, set the knives, and properly set the height of the outfeed table—in that order.

1 Check the tables for parallel alignment

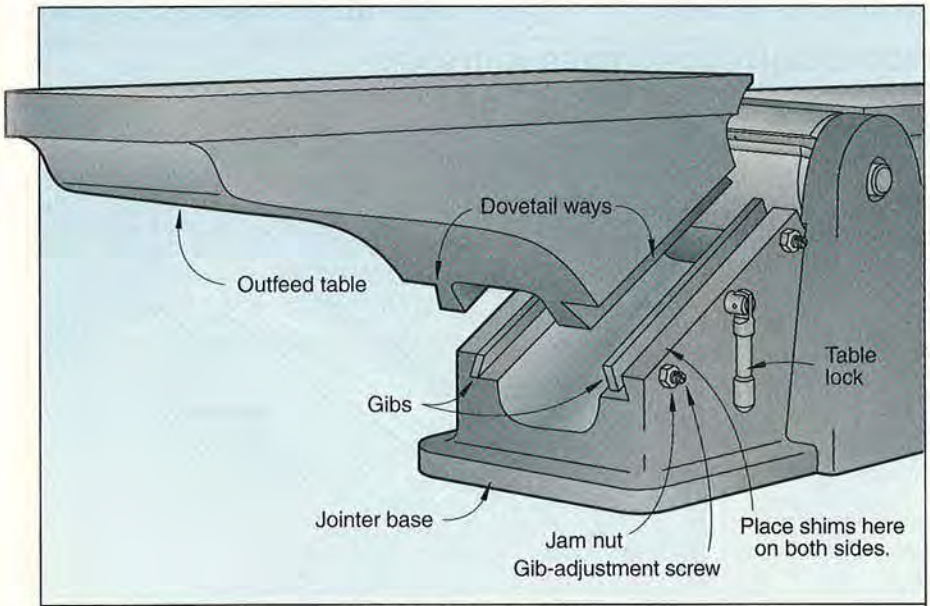
Though the two tables aren't on the same plane during use, they must be absolutely parallel with each other along their entire length. Tables that sag at one end or the other (or both) will cause concave cuts. Tables that are high at their outer ends will produce convex cuts. And an outfeed table that's parallel with the infeed table, but lower than the knives, will result in a condition called "snipe"—a small, hollow cut found at the end of a workpiece. This occurs when the infeed table no longer supports the workpiece.

To align the tables, first unplug the jointer, slide the fence completely off the table, remove the cutterhead guard, and raise the infeed table to the same height as the outfeed table. Now, lay a level or straightedge across both tables as shown *opposite page, top*. If any light shows under the straightedge at the outer end of either table, the table is sagging. Usually you can correct this by tightening the upper gib screw (see drawing *right*).

If you see light under the straightedge in the middle, next


Metal straightedge or level
Both tables raised to full height
Triangles should meet together with no gaps top or bottom. (use 12" triangles for this check)
Fence
Infeed table
Outfeed table

CHECKING THE INFEED AND OUTFEED TABLES FOR PARALLEL ALIGNMENT



ALIGNING THE TABLES
(EXPLODED APART FOR CLARITY)

to the cutterhead, the offending table or tables are high at their outer ends. Loosening the gib screws lowers them.

For even more accuracy when checking table alignment, use a pair of 12" triangles, as shown *top right*. Set one triangle on each table (not necessarily at the same height) with the 90° edges of the triangles touching. If you see a gap at the top, one or both tables are sagging at their outer ends. If there's a gap at the bottom, one or both table ends are too high.

This method won't tell you which table is the offender, but you can quickly find out by tightening the gib screws on the infeed table; if this doesn't bring them into alignment, try adjusting the outfeed table.

If your machine is old or gets lots of use, you may discover that tightening the gib screws won't fix a sagging table. This happens because the dovetail ways have worn over the years and must be shimmed to compensate for the accumulated wear.

We prefer to shim the outfeed table, because its adjustment range is very small, but if your jointer has a fixed outfeed table, you have no choice but to work with the infeed side.

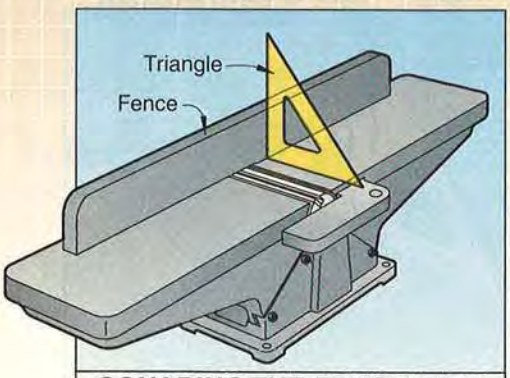
Shim with feeler gauges. To measure how much shimming is needed, loosen the lower gib screws, lift up on the outboard end of the table, and insert a feeler gauge ½" onto the surface where the table contacts the lower casting as shown *left*. Release the table, snug the gib-adjustment screws, and check to see if the table is parallel with the other one. After you've found the right thickness of shims, cut ½" lengths and install them. Finally, lock down the gib-adjustment screws and make a final check.

2 Square the fence for square cuts

A fence that's not exactly 90° to the tables can cause you a truckload of grief. Even a slight angle error can multiply through the course of a woodworking project. That's why we like to precisely set the fence at the beginning of each work session.

With your drafting triangle, the job should take only a few minutes. Simply loosen the bevel lock, position the triangle as shown on the *next page, top left,*

Continued



SQUARING THE FENCE WITH THE TABLES

move the fence until you see no gaps at the table or fence, and retighten the lock. Use the same technique to set the 45° angle.

(At this point, you may decide to adjust your 90° and 45° stops—but don't rely on them for critical work such as edge joining. Instead, check with the triangle every time you change the angle of the fence.)

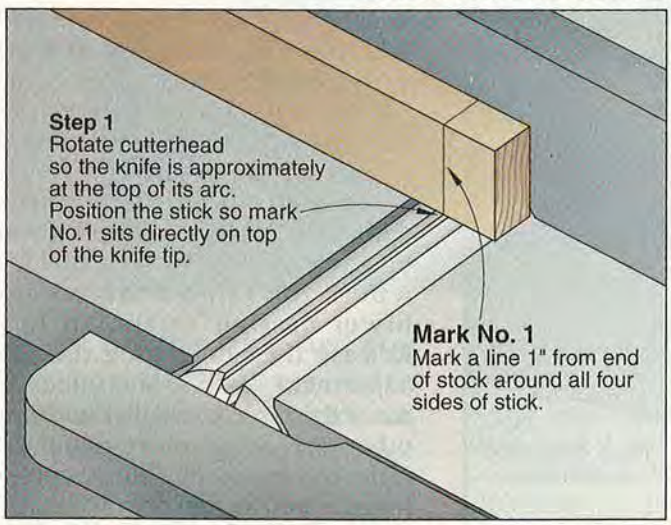
3 Set the knives

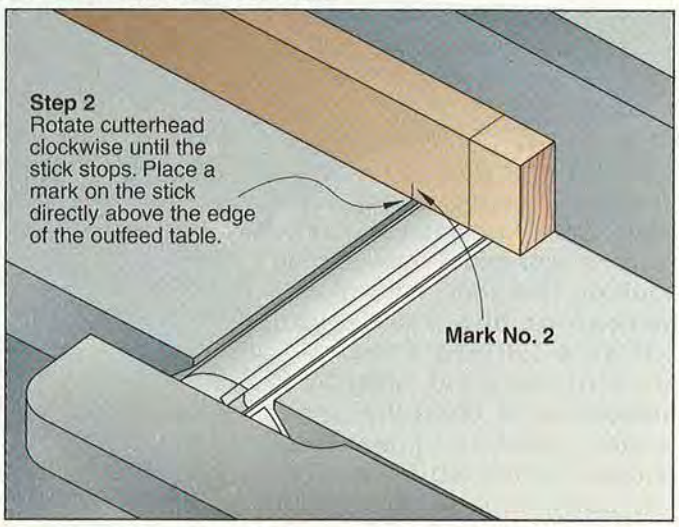
Even manufacturers have trouble setting knives perfectly. In our last test of 6" jointers ("Jointers Under $1,000," December 1995, pages 44-49), none of them arrived in their boxes with perfectly set knives. But guess what? All the machines still produced straight, smooth edges.

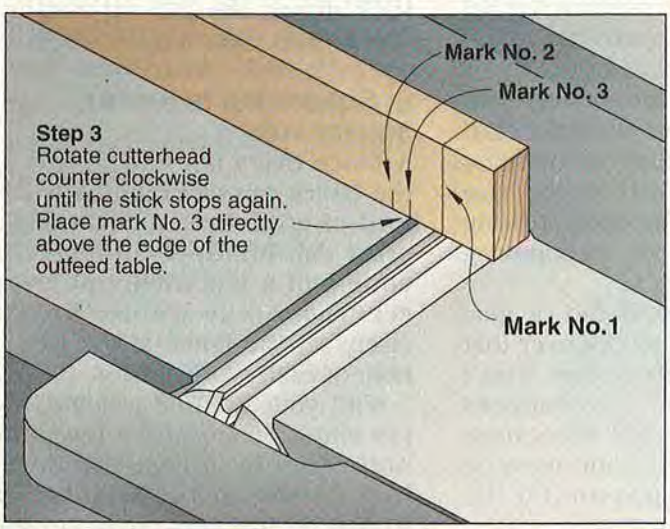
That said, we'll show how to set your knives quickly and at least as accurately as the factory did. Aim for a maximum variance of .002-.003" between the knives. If you want to spend the better part of a Saturday at it, you can get them closer—but we'd rather spend that time building projects.

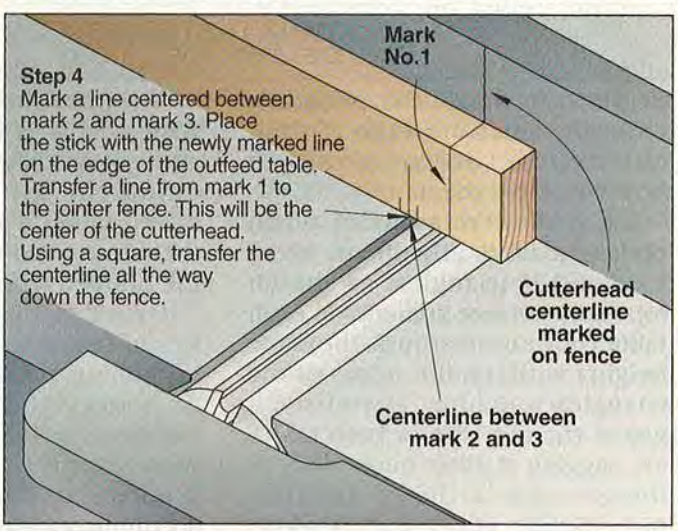
If your machine came with a two- or three-legged knife-setting gauge, don't bother using it. These gauges are designed to set each knife exactly the same height above the surface of the cutterhead. But few jointers have cutterheads that are perfectly parallel with the tables, which means

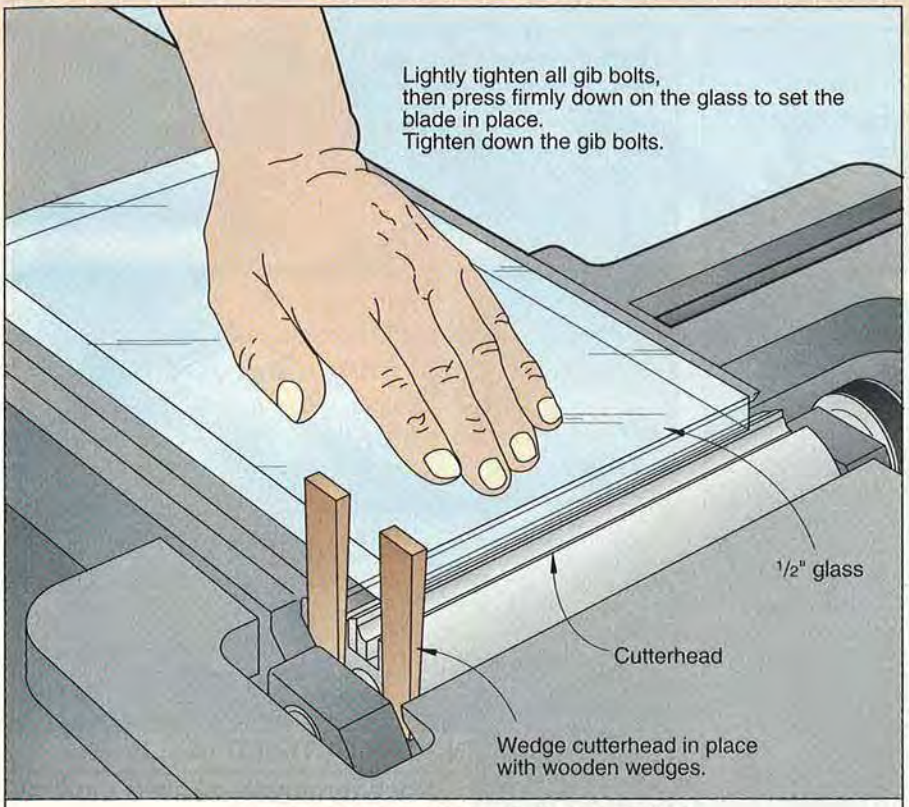
LOCATING THE CENTER OF CUTTERHEAD'S ARC


Step 1
Rotate cutterhead so the knife is approximately at the top of its arc. Position the stick so mark No.1 sits directly on top of the knife tip.
Mark No. 1
Mark a line 1" from end of stock around all four sides of stick.

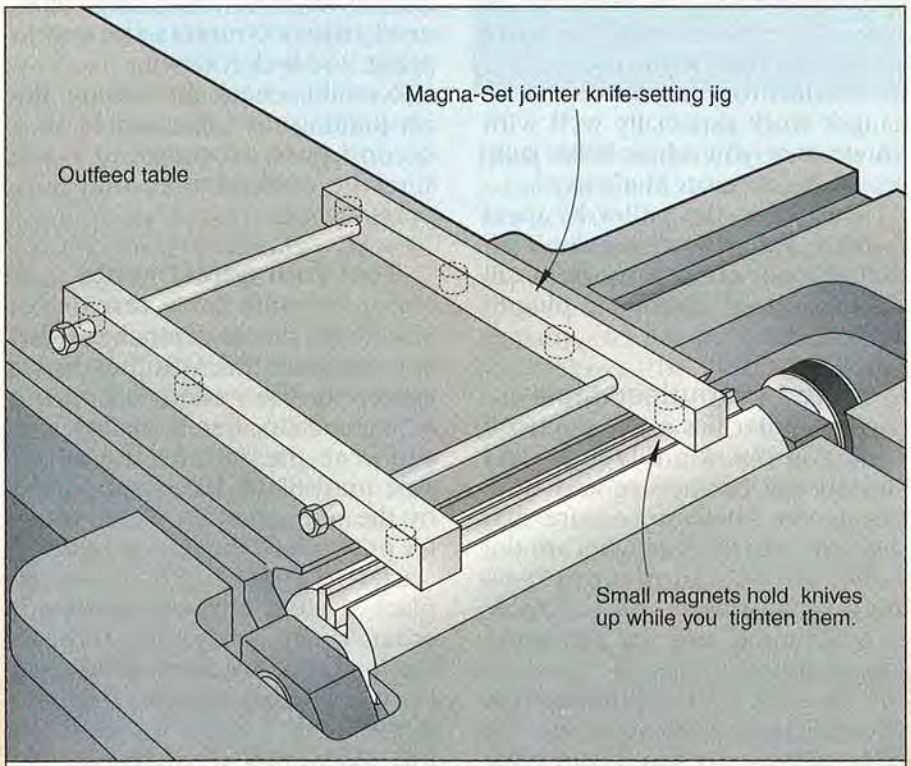

Step 2
Rotate cutterhead clockwise until the stick stops. Place a mark on the stick directly above the edge of the outfeed table.
Mark No. 2


Mark No. 2
Mark No. 3
Step 3
Rotate cutterhead counter clockwise until the stick stops again. Place mark No. 3 directly above the edge of the outfeed table.
Mark No.1


Mark No.1
Step 4
Mark a line centered between mark 2 and mark 3. Place the stick with the newly marked line on the edge of the outfeed table. Transfer a line from mark 1 to the jointer fence. This will be the center of the cutterhead. Using a square, transfer the centerline all the way down the fence.
Cutterhead centerline marked on fence
Centerline between mark 2 and 3


Lightly tighten all gib bolts,
then press firmly down on the glass to set the
blade in place.
Tighten down the gib bolts.
1/2" glass
Cutterhead
Wedge cutterhead in place
with wooden wedges.

SETTING THE KNIVES (LOW-TECH)



SETTING THE KNIVES (HIGH-TECH)

the cutterhead knives won't be parallel with the tables either.

We'll provide you with three options for setting the knives—one low-tech and two high-tech. Which you choose depends partly on the type of cutterhead your machine has.

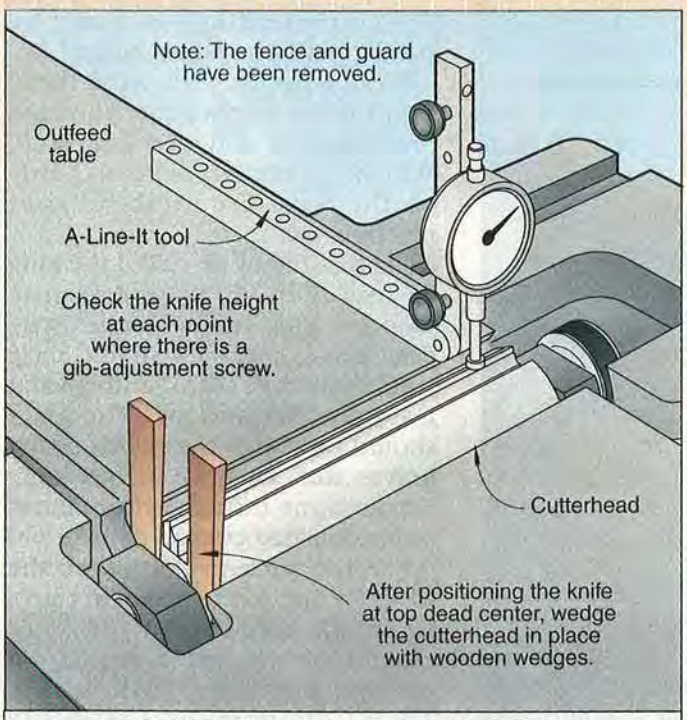
The first might be called the king of low-tech. It uses a simple wooden stick and a sheet of window glass. The stick should measure about ¾×1½×12" and have at least one flat surface. The glass should be cut to the width of the knives and about 12 inches long. To prevent cutting your hand, order polished edges.

Use the stick to determine the top of each knife's cutting arc. Begin by drawing a mark all around the stick at about 1" from one end (known as "mark No. 1"). Then, follow Steps 1-4 in the drawings *opposite page*. In Steps 1-3 mark No. 1 should be directly above the knife tip at all times. (It may help to keep light finger pressure on top of the stick.) After marking the cutterhead centerline on the fence, permanently scribe it with a scratch awl and triangle.

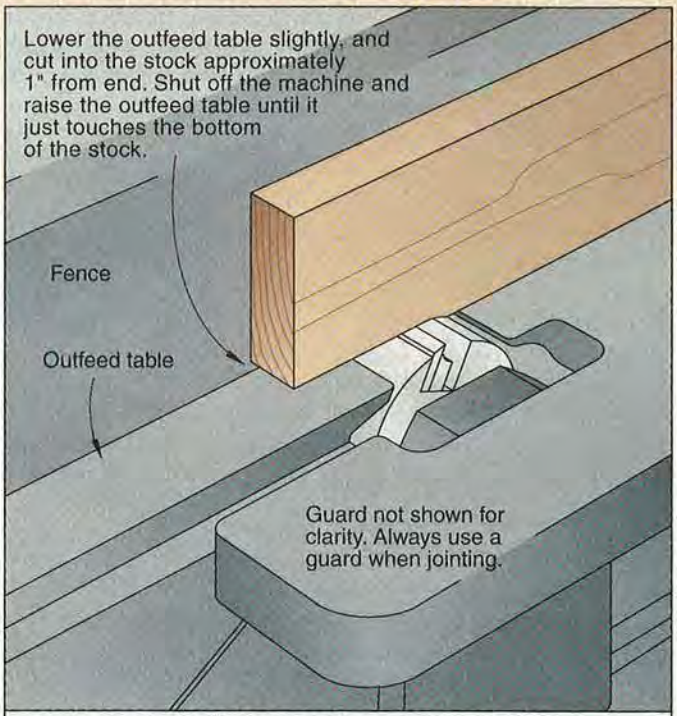
To set each knife, rotate the cutterhead until the cutting edge of the knife aligns with the mark on the fence. Check the alignment by setting a triangle against the fence and touching the knife. Immobilize the cutterhead by inserting tapered wood shims between the head and bearings, as shown *top left*. Loosen the knife gib bolts just enough so that the knife moves with firm hand pressure. Raise the knife slightly higher than the top of the outfeed table. Now, lay the glass on the outfeed table, extended to fully contact the knife. Press the glass to the table and slowly snug up the gib bolts, starting with ones at the ends and alternately working toward the middle.

Take care that you don't overtighten the bolts. Too much

Continued


Note: The fence and guard have been removed.
Outfeed table
A-Line-It tool
Check the knife height at each point where there is a gib-adjustment screw.
Cutterhead
After positioning the knife at top dead center, wedge the cutterhead in place with wooden wedges.

SETTING THE KNIVES (HIGH-TECH 2)


Lower the outfeed table slightly, and cut into the stock approximately 1" from end. Shut off the machine and raise the outfeed table until it just touches the bottom of the stock.
Fence
Outfeed table
Guard not shown for clarity. Always use a guard when jointing.

ADJUSTING THE OUTFEED TABLE

torque can force a knife out of alignment. To limit the amount of pressure you can apply, turn the wrench with only your thumb and forefinger. Set each knife in turn, aligning it with the mark on the fence.

Now, use the stick to check that each knife is set the same height as the others. Lay the stick on the outfeed table, lining up any one of the three table edge marks, and rotate each knife past it. All should move the stick the same distance at both ends.

For a high-tech way to set jointer knives, invest in a setting tool such as the Magna-Set (see *page 67* for a source). It consists of two steel or plastic bars that slide along a pair of parallel rods. As shown *previous page bottom*, each bar has small but powerful magnets that hold the jig to the table and the knives. This keeps each knife flush with the outfeed table while you tighten the gib bolts. Of course the Magna-Set won't work with an aluminum outfeed table.

A dial indicator setup, such as the A-Line-It, offers yet another way to set the knives. (See the drawing *above left.*) The indicator tells you exactly how high the knives are from end to end, and in relation to each other. These gauges work especially well with knives that you adjust with jackscrews that elevate the knives.

Finally, spin the pulley by hand to make sure the knives don't hit the tables or other parts. Reinstall the cutterhead guard, and plug in the machine.

4 Adjust the outfeed table

If your jointer has a fixed outfeed table, you can skip this step—and should use extra care and time setting the knives to ensure that the table and knife heights are the same. If you can move it, you need to adjust the outfeed table to exactly the same height as the tops of the knives.

We've found that the easiest way to do this is to lower the table slightly, set the infeed table for a light cut, and slowly feed stock through the knives until the cut edge projects over the outfeed table about 1". Now, shut off the jointer, raise the outfeed table until it just contacts the workpiece, and lock it down.

To double-check this setting, finish jointing the edge and make a second pass, stopping to make sure the outfeed table fully supports the cut.

5 Test your adjustments

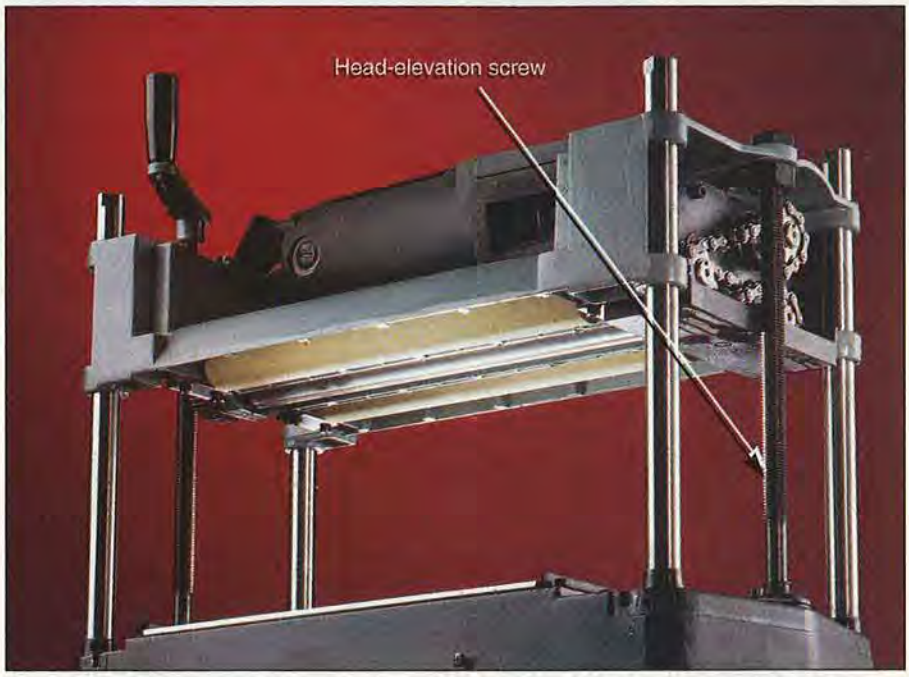
Now, it's time for a test drive. Select two pieces of stock that are approximately ¾×4×36", and pass each over the cutterhead on the ¾" dimension. Use a shallow cut and keep pressure on the infeed side until 8" to 10" is supported by the outfeed table. Then, transfer pressure to the outfeed side.

After you've milled both boards, place the cut edges against each other. If any light shows through the joint, unplug the machine and recheck the alignment of the tables. If the alignment checks out okay, you're probably not feeding the stock properly.

Continued

PORTABLE PLANERS

Compared to the versatility of the tablesaw and jointer, the planer is a one-trick pony. Its only purpose in life is to machine opposite faces of stock parallel with each other and to a desired thickness. Of course, even a pony has to learn its one trick well before you put it through its paces—and the same goes for a planer.



Planers come in many sizes and shapes, but all of them share similar components that need tuning from time to time. We will cover the basic adjustments here. Since your machine may vary somewhat from those shown in our illustrations, you may have to spend time getting familiar with the locations of its adjustment points. Your owner's manual should help, if you have one.

The four steps to planer-adjustment success

For a planer to do its job properly, the table must be parallel with the cutterhead knives along their length, the feed rollers must press the stock firmly against the table, and the knives must be set to exactly the same height. Here's how to get everything in sync.

1 Align the table with the cutterhead

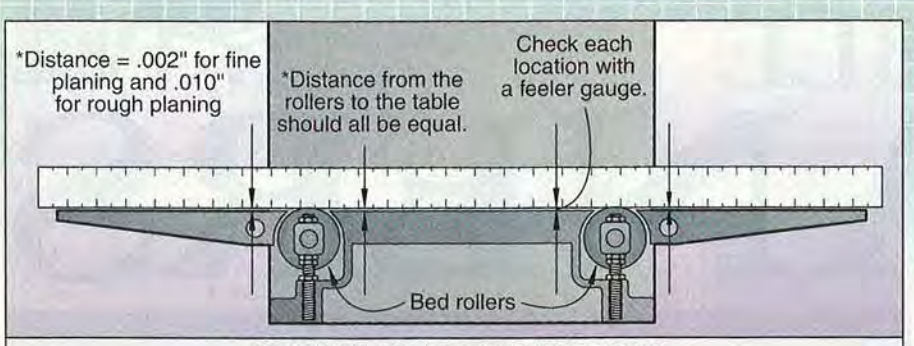
Begin by unplugging your planer and cleaning any rust or debris from its table. (Lower the table or raise the head assembly so you can get your hands in there.)

If your machine has bed rollers, adjust these first. Lay a straightedge on the rollers, and use a feeler gauge to check how far they stick above the table. This distance should measure .002" for most planing work. If you work with rough-cut stock, and find that it doesn't feed smoothly, adjust the rollers as high as .010" above the table. If the rollers need adjusting, check your owner's manual to learn how to do it. With some planers, you make the adjustment with shims. And with others you change the rollers' elevations with screws, as shown *next page top*.

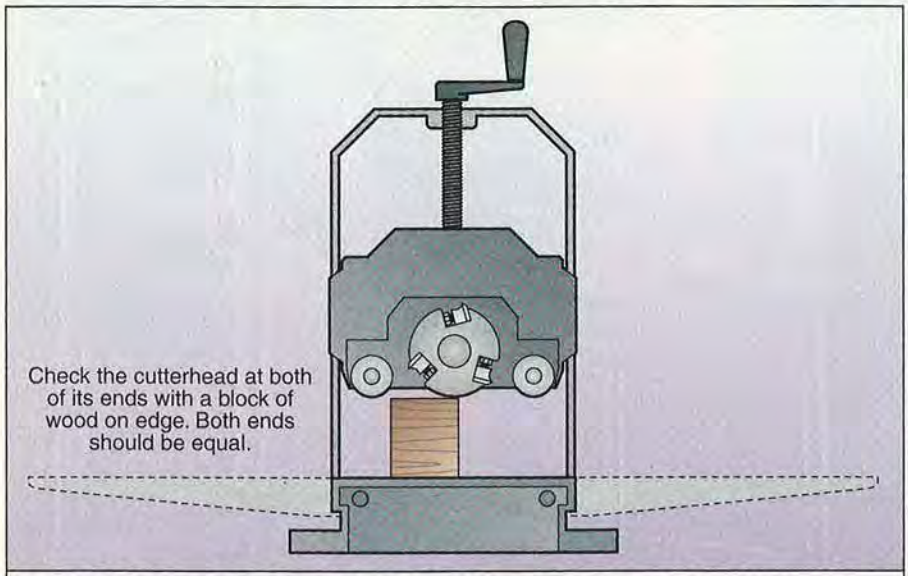
After you've adjusted the bed rollers, if any, find out if the table is parallel with the cutterhead. To produce stock that is the same thickness across its width, the table and cutterhead must be within .005" of parallel.

The simplest way to do this is to insert a piece of stock on edge between the table and one end of the cutterhead, as shown *next page middle*. Then, adjust the elevation until the cutterhead just touches the stock. Slide the stock along the table and under the cutterhead to the other end of the cutterhead. If the table is parallel to the cutterhead, the stock will not jam into the cutterhead or separate from it, showing daylight as you move it.

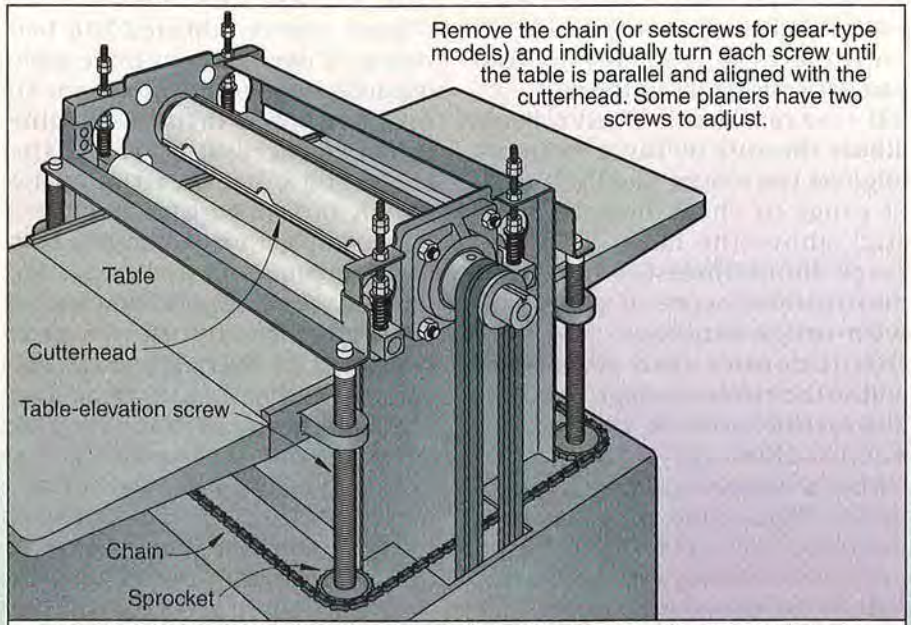
Continued


*Distance = .002" for fine planing and .010" for rough planing
*Distance from the rollers to the table should all be equal.
Check each location with a feeler gauge.
Bed rollers

CHECKING THE BED ROLLERS



CHECKING THE TABLE FOR PARALLEL WITH CUTTERHEAD


Remove the chain (or setscrews for gear-type models) and individually turn each screw until the table is parallel and aligned with the cutterhead. Some planers have two screws to adjust.
Table
Cutterhead
Table-elevation screw
Chain
Sprocket

ADJUSTING THE TABLE PARALLEL WITH THE CUTTERHEAD

If the table isn't parallel, again check your owner's manual. Most planers have two or four table- or head-elevation screws that pass through the table or head, as shown in the photo on the *previous page* and in the drawing *bottom*. These interconnect with gears or chains so they all turn in unison. To adjust this style of table or head, disconnect the screws from each other either by loosening setscrews that hold the gears to the screws, or by removing the chain that runs around sprockets under the table.

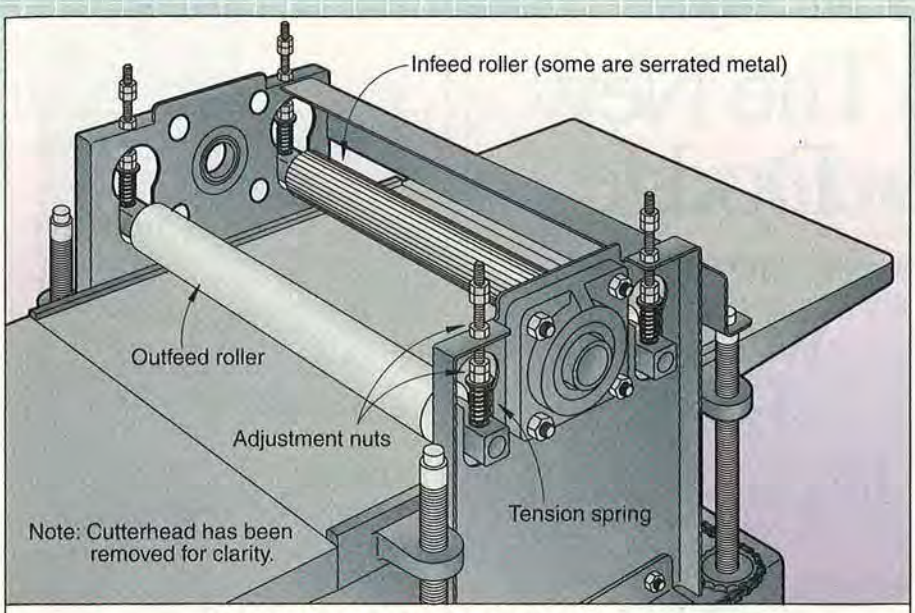
Now, individually turn the screws until your piece of stock contacts both ends of the cutterhead without binding. Then, retighten the setscrews or reinstall the chain.

(With some portable planers, like the Delta on the *previous page*, you adjust the head, not the table. You loosen a pair of nuts and turn bushings that raise or lower the head, then retighten the nuts. We removed the side covers of this machine to reveal its inner workings.)

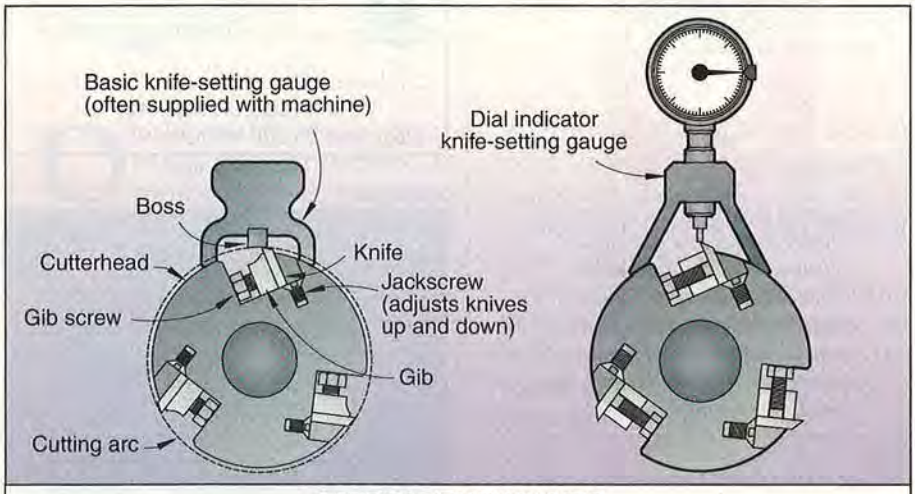
2 Adjust the feed rollers

Feed rollers, made of rubber or serrated metal, run the stock between the cutterhead and the table at a consistent rate. If your planer leaves marks on the wood, feeds erratically, or stalls, the rollers may be exerting too much pressure. Too little roller pressure, or rollers coated with pitch and gum, contributes to a jerky feed rate—and also can cause kickbacks.

Most planer rollers are spring-loaded, like the ones *left*, so they can follow uneven stock. If you suspect that your machine's rollers are applying too much or too little pressure, check your owner's manual to learn how to adjust their springs. Adjustment



ADJUSTING THE FEED ROLLERS



SETTING THE KNIVES

systems vary from manufacturer to manufacturer.

Clean off dirty metal rollers with solvent and a wire brush. Wipe rubber rollers with a rag dampened in mineral spirits. Go lightly. Too much solvent can damage rubber rollers.

3 Set the knives

A planer can't produce smooth, ripple-free surfaces unless its knives are razor sharp and set a uniform distance above the cutterhead. As with jointers, a planer's knives are held in place by gibs and are raised and lowered in most cases with springs or jackscrews. You can adjust them with the basic knife-setting gauge that may have come with your machine, or with a dial indicator knife-setting gauge.

Begin by loosening and removing the knives. Clean the gibs and slots in the cutterhead with solvent to remove any wood residue. Reinstall a sharpened knife in each slot, but tighten its gibs or jackscrews only part way; you should be able to move the knives with slight pressure.

(Some portable planers have fixed-position knives that you don't have to adjust. You simply bolt new knives into holders that automatically locate the knife at the proper height.)

The basic knife-setting gauge works well for setting the knives in a planer because the knives must be set parallel to the head. Set the gauge over a knife at each gib bolt, as shown in the drawing *middle left*. A small boss on the gauge contacts the edge of the knife and helps prevent the knife from creeping upward. Tighten the gib bolts in increments, starting with the outside bolts and moving toward the center.

If a knife creeps up slightly as you tighten it, tap it back into place with a block of hardwood. If a knife is a little low, lift it with the jackscrews.

A dial indicator knife-setting gauge works in much the same way as the basic gauge, but it shows you exactly how well you set the knives. Attempting to set all three knives to the exact same height may take an hour or more. So, consider the job well done if you come to within .001". As with a jointer, don't overtighten the knife bolts.

4 Reset the depth gauge

Now, give everything a final once-over, including a quick spin of the head by hand to make sure the knives don't collide with other parts. Finally, plug in the machine, turn it on, run a piece of stock through it, measure the stock's thickness, and use this dimension to reset the planer's built-in depth gauge.

Written by Jim Hufnagel
with Bob McFarlin and Dave Henderson
Illustrations: Kim Downing
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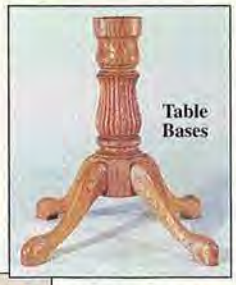

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CITRISTRIP

For this photograph, Victor Baker re-created what happened when his radial-arm saw kicked back a 2x2x18" piece of pine. It penetrated a fiberglass garage door and flew 15' into the driveway.

Kickback: Don't let it happen to you

Safety Man Mike Gililland tells you how to deal with this sawing danger

Mike Gililland is a lifelong woodworker and an engineer with 25 years' experience designing and working with woodworking power tools to make them safer. A resident of Missouri, he owns and operates a safety-consulting firm.

Send your safety-related question, stated simply, with a SASE to: The Safety Man, WOOD® *Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. Not all questions will be published, but each will receive a reply.*

Of the many reader questions that I received in response to my first safety column ("What your owner's manual can do for you," *WOOD* magazine, October 1995), one from woodworker Victor Baker of Jefferson, Ohio, really caught my attention. Vic's photo *above* vividly depicts what can happen (ouch!) when you try to rip wood incorrectly on a radial-arm saw.

Vic had a binding or misalignment problem, both causes of kickback. To avoid them, be sure the blade—a sharp one—is parallel to the fence before you rip. Check the alignment often (radial-arm saws become misaligned more easily than tablesaws). Here are some other guidelines:

- Always stand at the infeed side and out of line with the workpiece (as Vic luckily did). Keep your hands there, too.
- Never reach around the blade to pull at the board.
- Use a pushstick to feed and a feather board to steady the work.
- For radial-arm saws, set the nose (infeed side) of the guard to just clear the work. Also set the antikickback fingers and spreader at the outfeed side.

Along the same line, William Belz, Jr., from Cheektowaga, New York, wondered what is the best thing to do if the wood you're ripping does start to bind. In this case, "best" may be a relative term, but here's what I do if it happens during the cut: Hold the workpiece firmly in place—don't let it move—and turn off the saw. When the blade stops, remove the wood and correct the problem. Trying to retrieve a bound board with the saw blade moving only worsens the situation. And remember to always check the blade-to-fence alignment after repositioning the fence. It takes just a few seconds to correct for potential binding.

Remember, too, that a binding board might kick back. If you believe it's inevitable, *get out of the way!* One great woodworking tragedy is the sacrifice of personal safety for the sake of a piece of wood. No matter what the board costs, it's replaceable. Your fingers (or worse) are not.

Safe thin-strip ripping

For ripping, owner's manuals tell you to keep the wider portion of the board between the blade and the fence. That's to encourage you to push that part of the board. Pushing on the part outside the blade can result in kickback (look at Vic's photo if you doubt how serious that can be). But this requires always readjusting the rip fence. Rushville, Maryland, reader Kent Drew wants to know a safe way to make repeated narrow rips without readjusting the fence.

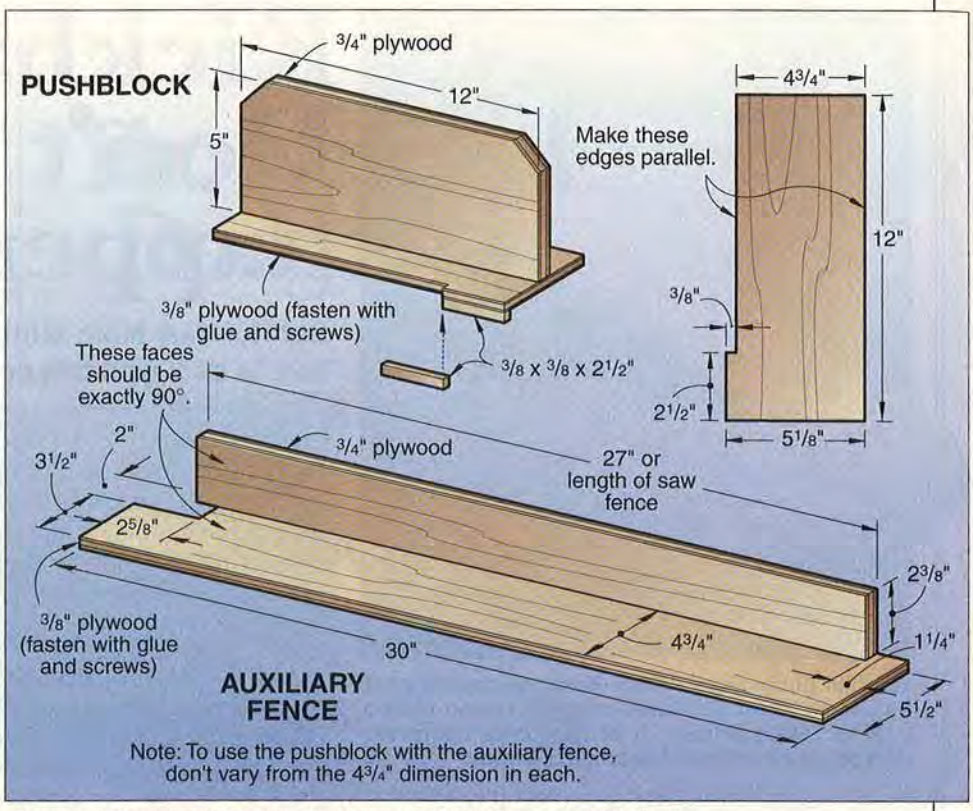
There are several ways, Kent. And you can make a number of fixtures to help you, but they mostly require removing the blade guard. Here is one method I like that retains the blade guard for added safety.

Continued on page 84

WHERE SAFETY BEGINS

Continued from page 83

Clamp the auxiliary fence (shown in drawing *below right*) to the saw's rip fence with C-clamps. Use the pushblock (see Pushblock drawing *right*), resting on the flat part of the auxiliary fence, to do the feeding. With a pushstick in your free hand, guide the board carefully without applying pressure against the blade. Of course, follow all other safety instructions on ripping, too, including using the blade guard and standing out of the line of a possible kickback. Also, use only unwarped, knot-free wood to avoid splintering and binding. And as a rule of thumb, I recommend starting with a board that is less than six rips wide. Stability is harder to maintain with a board wider than that.



Drawings: Roxanne LeMoine Photographs: Victor Baker; Ann Gililland

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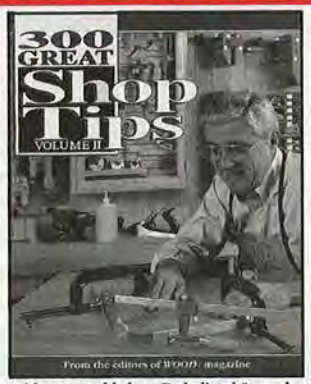

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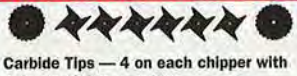

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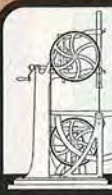

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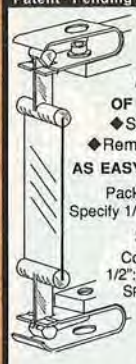

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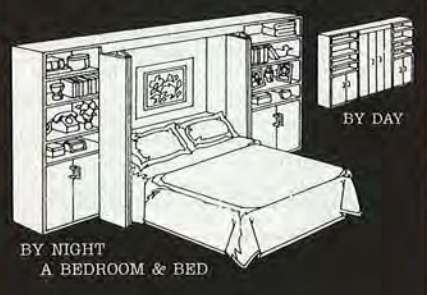

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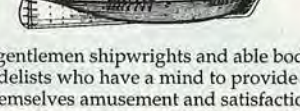

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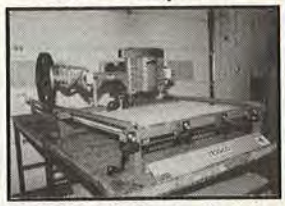

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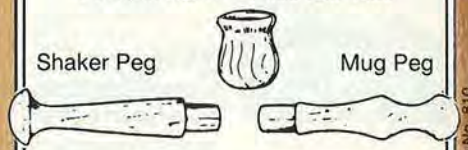

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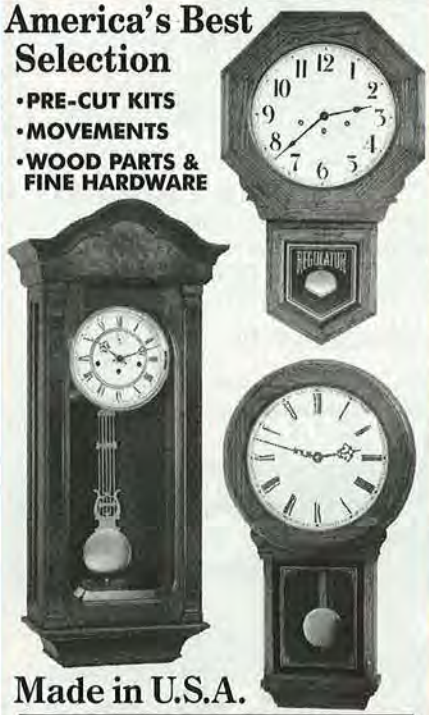

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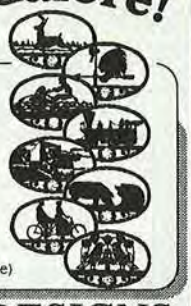

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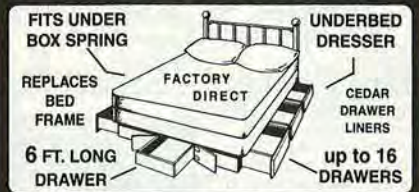

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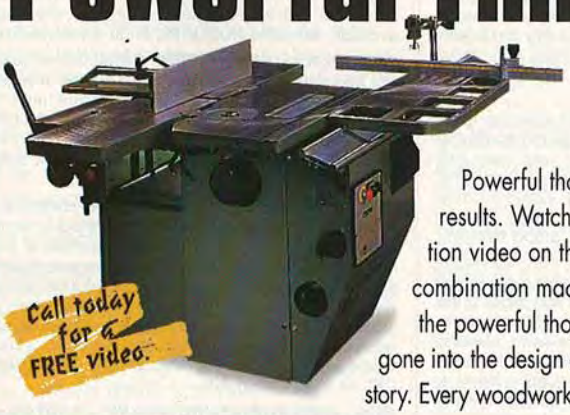

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WOODWORKER'S RESOURCE

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Make no mistake—the number of home inspections being done each year is on the rise. With today's low home mortgage interest rates, real estate sales are way up—banks and mortgage companies often insist that a home inspection be conducted by a qualified professional prior to sale. This means an incredible increase in demand and in money-making opportunities for trained Home Inspectors. **Qualified Home Inspectors are earning anywhere from $100 to $300 per inspection**—and the average home inspection only requires a few hours of time to complete. Think what that means in terms of total weekly earning potential.

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Wax cleans, protects, and polishes

In the past, I've tried dozens of products to polish and rust-proof the tops of my cast-iron machinery tables. All of them have shortcomings, so I was eager to see what Renaissance Wax could do.

I quickly found that this white paste wax spreads easily with a soft cloth. It takes minimal effort to buff out by hand and leaves a crystal-clear finish. Despite the humidity in my shop, I detected no rust or fingerprints over the course of about six weeks.

The manufacturer also says that Renaissance Wax can be used on furniture, so I applied some to a finished wood tabletop. The solvent in the wax picked up traces of dirt and grime even though the piece was clean and well maintained. Then, I buffed it to an even, mirror-like sheen.

To test the protective properties of this product, I waxed a piece of unfinished oak and poured a soft drink on it. After 30 minutes, I wiped the liquid off. The soft drink did not penetrate the wood, and I didn't see any discoloring.

—Tested by Bob McFarlin

PRODUCT SCORECARD

Renaissance Wax

Performance	★ ★ ★ ★ ★
Price	about $19 for 8 ounces
Value	★ ★ ★ ☆ ☆

Cutlery Specialties, 22 Morris Lane, Great Neck, NY 11024. Call 516/829-5899.

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Despite their small size, these clamps exert lots of pressure—more than enough for small projects. Although the small size doesn't translate into a small price, I think these clamps will prove essential for hobbyists and model makers.

—Tested by Bob McFarlin

PRODUCT SCORECARD

Quick-Grip Micro Bar Clamp

Performance	★ ★ ★ ★ ★
Price	about $10
Value	★ ★ ★ ★ ☆

American Tool Co., 8400 Lake View Parkway, Suite 800, Kenosha, WI 53142. Call 414/947-2440.

Jet's new cabinet saw has left-tilt blade

I recently had the opportunity to go to Jet headquarters near Seattle to test a preproduction sample of its new tablesaw *above*. The Jet XACTASAW Left, like its predecessor the XACTASAW Right, closely matches the Delta Unisaw in construction and performance. Unlike those two saws, the XACTASAW Left has a left-tilting blade. Not surprisingly, Jet positions this saw to compete against the only other left-tilting cabinet saw on the market, the Powermatic Model 66.

The XACTASAW Left comes with a 50" XACTA fence that closely resembles the 50" Biesemeyer fence on the Model 66. A similarly equipped Model 66 with a 3-hp motor costs $300 to $400 more.

In my tests, the XACTASAW Left performed flawlessly. Its fit and finish are excellent. I rank it about equal to the Model 66 except for its motor. The Model 66 comes with a high-quality, U.S.-made Baldor motor that starts more smoothly than the Taiwanese motor on the XACTASAW.

—Tested by Bob McFarlin

PRODUCT SCORECARD

Jet XACTASAW Left Tablesaw

Performance	★ ★ ★ ★ ☆
Price	$1,699
Value	★ ★ ★ ★ ★

Jet Equipment & Tools, P.O. Box 1349, Auburn, WA 98071-1349. Call 800/274-6848 or 206/351-6000.

Continued on page 100

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*Better Homes and Gardens® WOOD® Magazine (Nov. '95)

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3283DVSK RO Sander Kit$ 117
3310K NEW Cordless 193

BLACK&DECKER

2872K2
with 2 batteries
12V $188
2874K
14.4V $208

1180	1/2" Drill	$ 118
2037	Drywall Screwgun	89
2037W	Drywgun w/50ft cord	109
2038	HD Screwgun	89
2660	Drywall Screwgun	75
2670	1/2" Impact Wrench	149

ADELTA

37-070
$257
6" Table Top Jointer

14-650	Hollow Mortise Chisler	284
17-960	Oss.Sander Kit	79
22-540	12" planer	384
23-710	Sharpening Center	164
28-185	10" band saw	168
31-080	1" Belt 5" Disc Sandr	88
31-460	4" Belt 6" Disc Sandr	126
32-100	Plate Joiner	254
36-040	8" Compound Miter	149
36-090	Sidekick 10" Miter Saw	218
36-210	10" Compound Mit'	248
40-150	15" Scroll Saw	115
40-560	16" Scroll Saw	168
35-617	10"x50T Carbide Blade	34
35-677	14"x108T Carbide Blad	75

REG

STSE380	Jig Saw	59
VS280	1/2 sheet sander	39

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60	N/A	100 pc	12.95	11.95
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220	8.85	100 pc	10.95	9.95

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triangle sanders

Ryobi	30 pc assorted	$4.25
Fein	30 pc assorted	6.95
Bosch	50 pc assorted	10.50

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2469	36" w/ hand hole	46
2467	48" w/ hand hole	49
2468	72" w/ hand hole	104
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2701	8 ft —3vial	125

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C10FA	10" Miter Saw	299
C10FS	10" Slide Miter	739
C15FB	15" Miter Saw	669
NR83A	Framing Nailer	398
EC12	2hp Compressor	286

RYOBI

OSS450 Spindle Sander $159
AP10 Replacement Blades 24.95

DC500	Detail Carver	62
HT20VSK	MULTI TOOL	56
JM80K	Biscuit Cutter	99
J60VK	JigSaw Kit	85
RJ100VK	Reciprosaw	99
RS115K	RO Sander Kit	69
SC162	Scroll Saw	119
SC162VS	VS Scroll Saw	164

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EZ1	shoes pins & staples	97
250SK	18 G 3/4- 2" Kit	163
350K	16G 3/4- 2" Kit	193
565T	2-1/2" Finish Gun	204
626SK	1/4" Crown 1" StaplerKit	104
8290	Frming Nailer	318

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DW100	3/8" Drill	67
DW106	3/8" Keyl'ss Drill	74
DW411	Palm Sander	58
DW610	Router	148
DW930K	Cordless Saw	198
DW935K	Cordless Saw	236
DW972K2	12V Cordl' drill	187
DW974K	14V Cordl'	198

DW705
12" Compound Miter $358

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Continued from page 98

Reciprocating saws offer something for everyone

I've tried many makes and models of reciprocating saws. But when it came time to buy one for myself, I purchased one of the smallest, the Porter-Cable model 9647 Tiger Cub. Although its 4.8-amp motor doesn't match the muscle of saws in the 10-amp range, I've used it to cut everything from 4×4s to 4" cast-iron drain pipes.

The Tiger Cub's top speed, 2,600 strokes per minute, matches that of the big saws. But it sometimes doesn't cut as fast because it doesn't have the power to maintain top speed under heavy pressure. The slim profile of the Tiger Cub helps you reach tight spots, but the greater weight and two-handed operation of the bigger saws give them more stability during the cut.

Although the Tiger Cub has enough brawn for the average homeowner, it's not the ideal saw for everyone. If you remodel professionally, or plan on doing a lot of demolition, then you're better off with a full-sized reciprocating saw such as the new Porter-Cable model 9737 Tiger Saw.

The first thing I noticed about this 9.6-amp saw is that it weighs nine pounds, putting it squarely in the heavyweight arena. What really interested me, though, are the Quick-Change system for replacing blades, and the dual-action cutting modes—orbital and straight reciprocating.

Compared to the blade clamps found on most other reciprocating saws (and the Tiger Cub), which require an easy-to-lose Allen wrench, the Tiger Saw's Quick-Change system was a joy to use. To install a blade you simply give a half-turn to a spring-loaded collar located at the top of the reciprocating shaft. Then, drop in the blade and let go of the collar. The process takes just a second or two. To release the blade, you turn the collar counterclockwise about a quarter-turn. In my tests, the collar held blades securely and released them without a problem.

I was surprised that the orbital motion didn't deliver a big increase in the cutting speed. It took me about four seconds to cut through a 2×4 with the saw in the orbital mode, compared with five seconds in the straight-reciprocating mode. (The Tiger Cub, which does not have reciprocating action, severed the 2×4 in seven seconds.) So the orbital motion will only save you a few minutes over the course of a big job.

One final point of comparison: For time-consuming cuts in metal, I prefer the Tiger Cub's sliding on/off switch and dial-type variable-speed switch. The Tiger Saw's trigger-type switch controls both the on/off function and the variable speed. This requires that you pay careful attention to your finger pressure when making cuts in metal which require slow blade speeds. On quick-cutting tasks, the all-in-one switch on the Tiger Saw proves more convenient.

—Tested by Bill Krier

PRODUCT SCORECARD

Porter-Cable model 9647 Tiger Cub reciprocating saw kit

Performance	★ ★ ★ ★ ★
Price	$125
Value	★ ★ ★ ★ ★

Porter-Cable model 9737 Tiger Saw reciprocating saw kit

Performance	★ ★ ★ ★ ☆
Price	$170
Value	★ ★ ★ ★ ☆

Porter-Cable, P.O. Box 2468, Jackson, TN 38302-2468. Call 800/487-8665.

Continued on page 102

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3X18	.86 ea	4X36	1.35 ea
3X21	.90 ea	6X48	3.50 ea
3X23 3/4	.93 ea	6x89	6.24 ea

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PRODUCTS THAT PERFORM

Continued from page 100

Templates quickly mark corners

Anybody who has tried to draw a radius using cans, coins, or similar objects will greatly appreciate the accuracy of Quick-Corner Templates. And if you typically haul out a compass or rule to mark radii and 45° corners, the quick corner templates will greatly speed these procedures.

The green template contains 45° corners that measure ½, ¾, 1, 1¼, 1½, 1¾, and 2" across. The small yellow template gives you convex radii of ½, ¾, 1, 1¼, 1½, 1¾, and 2", and the large yellow template offers 3, 4, 5, and 6" radii. For concave corners, the blue template provides you with ½, ¾, 1, 1¼, 1½, 1¾, and 2" radii.

To use these polycarbonate templates, you simply lay the section of the template with the desired profile on the corner of your workpiece, and then follow the curve or angle with your pencil. Locating lugs molded into the bottom side of the templates make positioning foolproof.

—Tested by Dave Henderson

PRODUCT SCORECARD

Quick-Corner Templates

Performance	★ ★ ★ ★ ★
Price	about $6 each, $20 for a set of four in catalogs.
Value	★ ★ ★ ★ ★

Streamline Manufacturing, 2100 E. 1000 S., Brigham City, UT 84302. Call 801/723-8665.

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DELTA TOOLS

Model	Description	List	Sale
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23-700	Wet/Dry Grinder	206	159
23-710	New Sharpening Center	217	169
23-680	6" Bench Grinder 1/4 HP	80	69
11-950	8" Drill Press	176	128
31-050	1" Belt sander 2.0 amp	95	78
31-460	4" Belt/Disc Sander	198	135
40-560	16" 2 speed Scroll Saw	230	165
11-990	12" Bench Drill Press	255	184
11-090	32" Radial Bench Drill Press	405	315
43-505	1/2" Bench Router/Shaper	398	299
22-540	12" Bench Top Planer	Sale	369
36-220	10" Compound Mitre Saw	294	208
28-185	Bench Band Saw	213	175
28-190	NEW 12" Band Saw	497	395
40-640	20" Bench Scroll Saw	466	295
37-070	NEW 6" v/spd Bench Jointer	351	255
14-650	Hollow Chisel Mortiser	380	265
46-700	12" Wood Lathe	575	479
33-990	10" Radial Arm Saw	981	779
33-055	8-1/4" Sawbuck comp w/legs	846	665
36-905	30" Unifence	346	245
36-906	50" Delta Unifence	444	319
36-755	10" Tilting Arbor Saw	Sale	1129
17-900	16-1/2" Floor Drill Press	490	415
33-060	"Sidekick" Miter Saw	541	399
37-190	6" Deluxe Jointer	603	489
36-275	8-1/4" Builders Saw	358	268
36-210	10" Compound Mitre Saw	344	249
36-040	8-1/4" Compound Mitre Saw	190	135
36-070	10" Mitre Saw	217	165
34-555	Sliding Table	487	325
22-675	NEW DC380 15" Planer	Sale	1175
37-154	6" Jointer DJ-15	Sale	1289
34-444	Contractors Table Saw	Sale	659
34-445	34-444 Saw w/30" Unifence	Sale	839
28-283	14" Band Saw 3/4 HP motor	Sale	779
28-280V	14" Band Saw 1 HP motor	Sale	798
28-275	14" Band Saw 3/4 HP	Sale	649
36-250	NEW 10" Slide Compound Saw	825	489
36-230	NEW 12" Compound Mitre Saw	480	345
31-780	NEW Oscillating Spindle Sander	253	188

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6527	NEW Sawzall with case	343	179
6528	above Sawzall w/wired cord	339	165
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0406-1	9.6V Drill Kit with 2 batteries	315	159
0224-1	3/8" Drill 4.5 amp magnum	236	132
0234-1	1/2" Drill 4.5A mag 0-850 rpm	255	129
0235-1	1/2" Drill w/keyless chuck	255	129
0244-1	1/2" Drill 4.5A mag 0-600 rpm	255	129
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	213	119
0228-1	3/8" Drill 3.5 amp 0-1000 rpm	207	118
0375-1	3/8" close quarter Drill	255	148
0379-1	1/2" close quarter Drill	288	165
6546-1	cdls Scrwdvr 200 & 400 rpm	150	86
6547-1	6546-1 w/bits,1/4" chuck & cs	185	105
5399	1/2" D-hdle Hammer Drill Kit	356	194
6507	Original SawZall with case	278	149
5397-1	3.8" v/ spd Hammer Drill Kit	275	145
5371-1	1/2" v/ spd Hammer Drill Kit	360	194
3107-1	1/2" v/spd right angle Drill Kit	411	234
3300-1	1/2" w/ spd right angle Drill	378	199
5680	Router 2 HP w/ 1/4" & 1/2" collets	367	165
6078	7"/9" 13 amp Grinder	295	159
6142	4-1/2" Grinder w/cse & acc.	224	125
6365	7-1/4" Circular Saw 13 amp.	229	125
6368	6365 w/fence, blde,& cse	259	142
6256	Top Handle Jig Saw	278	149
6490	10" Mitre Saw	496	265
6491	6490 w/ carbide blade & bag	594	329
6494	10" Compound Mitre Saw	585	315
0431-1	12V Drill w/ 2 batteries	441	229
6266-6	NEW Top Handle Jig Saw	315	165
6496	NEW 10" Slide Compound Saw	1050	579

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5/8" Bore - Industrial Grade

Item	Description	Teeth	List	Sale
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LU82M010	Cut-off 10"	60	93	47
LU84M011	Comb 10"	50	78	42
LU85M010	Super Cut-off	10"	80	115	59
LM72M010	Ripping 10"	24	69	38
LU73M010	Cut off 10"	60	84	45
LU87M010	Thin Kerf 10"	24	72	44
LU88M010	Thin Kerf 10"	60	88	49
LU98M010	Ultimate 10"	80	128	68
LU91M010	Compnd Mitre 10"	60	88	54
F410	Quiet Blade 10"	40	95	49
F810	Quiet Blade 10"	80	135	74
TK303	7-1/4" Finishing	40	38	25
TK906	10" Combo	50	53	32
SD308	8" Dado - Carbide		230	119
SD506	6" carbide w/case & shims		292	145
SD508	8" carbide w/case & shims		344	168
F10	2-1/8" x 3/4" Biscuit 1000 qty		43	29
F20	2-3/4" x 1" Biscuit 1000 qty		45	29
FA	Assorted Biscuits 1000 qty		45	29
FB100	16 piece Forstner Bit Set		338	194
94-100	5 pc. Router Bit Door System		320	169
BF3	NEW Router Table		495	289
FT2000E	3-1/4 HP v/sp Plunge Router		410	205
JS100	Biscuit Jointer w/ case		334	168
JS102	Biscuit Jointer w/fence & cs		355	179

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Model	Description	List	Sale
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766RDF-D	"Drywaller" 10 gal turbo vacuum	915	549
766RDF-DAS	Above vac w/ auto start	950	589

MAKITA TOOLS

6172DWE	3/8" v/spd Drill Kit w/ 2 batt	222	109
5090DW	3-3/8" Saw Kit 9.6 volt	280	148
DA391D	3/8 angle Drill 9.6V	166	109
DA391DW	3/8" angle Drill Kit 9.6V	341	179
ML900	Incandescent Flashlight 9.6V		37
6095DWE	9.6 volt Drill Kit w/2 batt	Sale	125
6095DWLE2	6095DWE w/flashlight	Sale	138
6095D	6095DW Drill only & cse	Special	79
632007-4	9.6 volt Battery	47	30
632002-4	7.2 volt Battery	39	28

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6201DWHE	9.6V 3/6" Drill Kit w/2 batt	351	159
6211DWHE	12V 3/6" Drill Kit w/2 batt	368	169
6311DWHE	12V 1/2" Drill Kit w/2 batt	399	205

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9924DB	3"x24" Belt Sander w/bag	360	189
4301BV	Orb. var. spd Jig Saw 3.5A	292	155
JR3000V	v/ spd Recip Saw w/case	264	135
9820-2	Blade Sharpener	433	215
N1900B	3-1/4" Planer with case	263	129
1912B	4-3/8" Planer	352	189
N9514B	4" Disc Grinder 4.6 amp	118	65
B04552	1/4 sheet Pad Sander w/bag	101	55
DA3000R	3/8" Angle Drill	355	175
2708W	8-1/4" Table Saw	637	309
6405	3/8" Drill Rev. 0-2100 rpm	115	65
6510LVR	3/8" Drill Rev. 0-1050 rpm	188	98
6013BR	1/2" Drill Rev. 6 amp	270	145
9401	4" x 24" Belt Sander w/bag	458	219
5007NB	7-1/4" Circular Saw 13 amp	242	124
5007NBK	5007NB Saw w/ plastic cse	250	125
LS1011	10" Slide Compound Saw	995	479
LS1211	12" Slide Cmpd Saw	1620	779
3901	Plate Joiner Kit	376	205
3612C	NEW 3 HP Plunge Router	492	259

SENCO AIR NAILERS

SFN1+	Finishing Nailer 1" - 2" w/ cs	448	345
SN325	Nailer 1-7/8" - 3-1/4"	665	419
SLP20	Pinner w/cs 5/8 -1-5/8"	422	275
SKS	Stapler 5/8" - 1-1/2"	390	279
SN70	Framing -Clip Hd 2"-3-1/2"	725	449
SN60	Framing -Full Hd 2"-3-1/2"	708	469
SN65	15% more power than SN60709		479
SFN40	Finish Nailer 1-1/4 - 2-1/2"	569	399

BOSTITCH AIR NAILERS

N80S-1	Stick Nailer	Super Sale	339
N80C-1	Coil Nailer	Sale	339
RN45	Coil Roof Nailer 3/4 - 1-3/4	845	369
N60FN-2	Finishing Nailer	557	335
BT35-2	Brad Tacker 5/8" - 1-3/8"	254	155
BT35-2K	BT35-2 w/ cse, oil, & brads	279	165
CWC100	1 HP Pancake Compressor	440	289
MIIIFS	Flooring Stapler 15 gauge	902	529
S32SX-1	Finish Stapler-1/2" - 1-3/8"	245	155
S32SX-1K	S32SX-1 with case & oil	269	165

SKIL TOOLS

2735-04	12 volt cordless Drill Kit	260	148
2736-04	2735-04 with keyless chuck	269	148
77	Famous 7-1/4" Worm Drive Saw	Sale	144
77M	NEW 77 Mag Worm Saw - 2 lbs lighter than Model 77	Sale	165

PANASONIC CORDLESS

EY6181CRKW	9.6V Drill Kit w/ 2 batteries, 1 hour charger, & case	307	169
EY6181EQK	9.6 volt Drill with 15 min. charger, case & Ironman battery	315	169
EY6100CRKW	12 volt Drill Kit w/ 2 batteries, 1 hour charger, & case	379	188
EY6100CQKW	Same as EY6100CRKW but has 15 minute charger	409	209
EY6100EQKW	12V Drill kit w/ 2 Ironman batteries, 15 min. charger, & case	379	199
EY6101SQK	12 volt 1/2" Drill w/ 15 min. charger, diagnostic battery, & case	438	249

PASLODE IMPULSE GUNS

IM250	Trimpulse Finish Nailer Kit	1130	548
IM325	Impulse Framing Nailer Kit	1130	548
CT325SS	Cdls Framing Nailer Kit	1120	495

CLAYTON OSCILLATING SPINDLE SANDERS

140	Portable sndr w/ 4-1/2" spindle	625	559
146	Portable sander w/ 9" spindle	685	609
100	Floor mount sndr 4-1/2" spindle	785	709
106	Floor mount sander 9" spindle	845	759

SIOUX TOOLS

8030	3/8" var/spd Drill	263	145
8000	3/8" var/spd close qtr Drill	211	125
690	5" Air Random Orbit Sander	228	132

1996 TOOL CATALOG AVAILABLE
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NEW Dewalt 18 volt Cordless Drills

DW995K
1/2" Drill Kit
Sale 229

DW997K
1/2" Drill/Hammer Drill Kit
Sale 249

DW936K
Saw Kit
Sale 249

DEWALT
High Performance Industrial Tools

TOOLS ON SALE™
AMERICA'S LOWEST PRICED TOOLS
FREE FREIGHT TO THE
48 CONTINENTAL STATES ON EVERY ITEM
PRICES SUBJECT TO CHANGE WITHOUT NOTICE

DEWALT TOOLS

Model	Description	List	Sale
DW364	7-1/4" Circ. Saw w/brake	294	158
DW610	1-1/2 HP 2 handle Router	266	152
DW411	1/4 sheet Palm Sander	88	58
DW100	3/8" Drill, 4 amp,0-2500 rpm	118	68
DW682K	Biscuit Joiner with case	448	219
DW705	12" Compound Mitre Saw	734	359
DW625	3 HP v/ spd PlungeRouter.	Sale	275
DW675K	3-1/8" Planer with case	292	164
DW431	3 x 21 v/spd Belt Sander	338	184
DW421	5" Palm Ran. Orb Sander	144	74
DW444	6" Ran Orb Sander	266	139
DW443	DW444 w/hook & loop pad.	266	139
DW673K	NEW Laminate Trimmer Kit	364	205
DW935K	NEW 14.4V 5-3/8" Trim Saw Kit	444	237

DW935K comes with two batteries!

DEWALT CORDLESS DRILLS

DW952K	3/8" variable speed w/ two 9.6V XR batteries	284	139
DW962K-2	3/8" variable speed w/ two 9.6 V XR batteries	330	179
DW972K-2	3/8" variable speed w/ two 12V XR batteries	362	189
DW904	12 volt flashlight	48	29.95
DW972K-2 drill & DW904 flashlight		*Sale*	*205*
DW991K-2	3/8"variable speed w/ two 14.4V XR batteries	415	225
DW994KQ	1/2" variable speed w/ one 14.4V XR batteries	458	235
DW994KQ-2	above drill w/ 2 batt.	Sale	259
DW996K	1/2" v/spdw/ two 14.4 XR batt	245	

Above drill kits come w/ charger & steel case!

DW991KS-2 DW991K drill, DW935 trim saw, & case ..... **Sale** 349

HITACHI TOOLS

C8FB2	8-1/2" Slide Compound Saw	1169	489
C10FC	10" Mitre Saw	533	209
C10FS	10" Slide Compound Saw	1627	739
P12R	12-9/32" Planer	1688	795
P12RA	Planer/Joiner	2203	995
G12SA	4-1/2" Grinder 6.9 amp	177	95
NR83A	Framing Nailer 2 - 3-1/2 Full Head	900	425
NR83AA	Framing Nailer 2 - 3-1/2	922	429
NT65A	16 ga. Brad Nailer 1 - 2-1/2"	749	325
NV45AB	Coil Roofing Nailer 7/8 - 1-3/4	935	419
EC6B	1 HP Oil Compressor	540	279
EC6C	1 HP Oil-less Compressor	580	289

BIESEMEYER FENCES

B-50	50" Commer. Saw	443	325
T-SQUARE 52	52" Homeshop	360	269
T-SQUARE 40	40" Homeshop	335	249
T-SQUARE 28	28" Homeshop	325	239

PONY CLAMP FIXTURES

Model	Description	List	Sale	Lots of 12
50	3/4" Black Pipe	15.45	8.10	92.50
52	1/2" Black Pipe	12.65	6.95	74.95

BOSCH

Model	Description	List	Sale
1587VS	Top Hand "CLIC"Jig Saw	292	139
1584VS	Barrel"CLIC"Jig Saw	288	139
	Bosch Metal Case for above Jig Saws	32	
	Bosch 30 blade assortment for Jig Saws	28.99	

1584VS or 1587VS
with steel case and 30 Bosch blades Sale 185

3270DVS	3"x21" v/spd Belt Sander	301	165
1276D	NEW 4"x24" Belt Sander	379	219
1275DVSN	NEW 3"x24" v/s Belt Sndr	379	219
1276DVSN	NEW 4"x24" v/s Belt Sndr	408	229
1347AK	4-1/2" Grinder w/cs & acc.	172	105
1194VSR	1/2" v/ spd Hammer Drill	272	155
1194VSRK	above Drill w/ case	303	169
1604A	1-3/4 HP 2 Handle Router	269	142
1604AK	same as above w/cse & acc	337	185
1613EVS	2HP v/s Plunge Router	369	199
1615EVS	3 HP v/s Plunge Router	536	289

1613EVS & 1615EVS come with FREE RA1051 Deluxe Router Guide !

1634VSK	NEW Recip Saw 10.5 amp	335	159
3310K	NEW 12V T-handle Drill Kit	345	178
3610K	NEW 14.4V Drill Kit	354	195
3107DVS	NEW 5" Random Orbit Sander	165	98
3107DVSK	3107DVS with case	195	115
3725DVS	NEW 5" Random Orbit Sander	256	149
3727DVS	NEW 6" Random Orbit Sander	266	154
B3915	NEW 10" Slide Compund Saw	1050	619
B1650K	Biscuit Joiner	286	169
B7000	Corner Detail Sander	126	68
B7001	B7000 w/ variable speed	Sale	89.95
B4050	In Line Jig Saw	206	119
11230EVS	SDS-max 1-1/2" Rtry Hmr	910	519
11231EVS	SDS-max 1-3/4" Rotary Hammer	1363	785
11223EVS	NEW SDS-max 2" Rotary Hammer	1595	915
11224VSR	7/8" SDS Rotary Drill	404	229

STABILA LEVELS

24640	24" Level w/ hand holes	62.20	43
24670	48" Level w/ hand holes	79.70	55
24680	72" Level w/ hand holes	145.45	99
27170	48" Level w/o hand holes	71	49
27000	78" Level w/o hand holes	146	102
80LMS	NEW Laser Level System	532	365

AIRY AIR NAILERS

Model	Description	List	Sale
0241SK	Brad Nailer 3/8"-1 9/16"	180	96
0250SK	Brad Nailer 3/4"-2"	296	164
0626SK	1/4" Crown Stapler 3/8"-1"	194	104
0645	1/4" Crown Stapler 3/4"-1-9/16"	310	175
EZ-1	Multi-purpose nailer & stapler	180	98

Above Nailers come w/case, fasteners, oil & wrenches

0565T	Angle Finish Nailer 1"-2-1/2"	386	205

PORTA NAILER

401	Porta Nailer complete	295	209
501	Face Nailer complete	295	209

DAVID WHITE

LP6-20	Sight Level package - 20x	329	215
LP6-20XL	LP6-20 w/9056 tripod & 7620 rod	275	
LT8-300	Level Transit - 26x	739	489
LT8-300P	above Level w/optical plum	869	565
LT6-900	Level Transit - 20x	419	269
ALT6-900	Automatic Level - Transit -18x	666	429
ALTP6-900	above Level w/tripod & rod	799	499
ALP6-18HD	above Level w/tripod & rod	599	395
LL100	NEW Finish Line Laser Level	199	135
ML200	NEW Visible Beam Laser	979	799

RYOBI SPECIALS

RE600	3 HP Plunge Router	500	228
BE321	3"x21" v/ spd Belt Sander	310	148
BT3000	10" Table Saw w/ stand	1125	529
AP12	12" Bench Planer	884	389
OSS450	Oscillating Spindle Sander	340	159
DC500	Detail Carver	120	64
HT20VSK	NEW Multi Tool	115	59
CD125K	NEW 12V cordless Drill w/ 2 batt	175	109

Msxe6362	FEIN Triangle Sander v/spd		205
Msx625	FEIN New Air Triangle Sander		195
LPN672	PONY Air Palm Nailer w/glove		94.99
RTM01	ROTOZIP Drywall cut out unit		68.95

QUAL-CRAFT PRODUCTS

2200	Pump Jack	79	58
2201	Pump Jack Brace	30	20
2203	Pump Jack guard rail holder	31	23
2204	Workbench & rail holder combo	53	39

Buy any 6 (can be assort.) deduct 10%

2601	Wall Jack	167	108

Lots of 4 deduct additional 10%

PORTER CABLE

9444	New Profile Sander Kit	220	119
7499	Ultimate Cut-out tool	119	69
97499	7499 w/ case & bits	150	89
690	1-1/2 HP Router 8 amp	278	142
9690	690 Router w/ steel case	309	159
691	1-1/2 HP Router D-handle	303	158
693	1-1/2 HP Plunge Router Base	338	184
6931	Plunge Router Base	139	79
695	1-1/2 HP Router/Shaper	418	235
696	Heavy Duty Shaper Table	238	135
351	3"x21" Belt Sander w/o bag	302	165
352	3"x21" Belt Sander with bag	312	169
352VS	3x21v/s Belt Sander w/bag	321	174
360	3"x24" Belt Sander w/ bag	397	214
361	3"x24" Belt Sander w/o bag	377	204
362	4"x24" Belt Sander w/ bag	412	224
97751	1/2" v/spd Hammer Drill w/cse	274	155
9118	Porta Plane Kit 7 amp	400	229
505	1/2 sheet Pad Sander	249	134
97549	Top handle Jig Saw 4.8 amp w/ case & blades	275	144
330	Speed Block Sander 1/4 sheet	120	65
556	Biscuit joiner w/5556 fence	Sale	139
345	6" Saw Boss 9 amp	207	114
9345	345 comp. w/cse & carb blde	237	138
9647	TIGER CUB Recip. Saw	230	134
9637	Full var/spd Recip Saw 8 amp	276	148
7519	3-1/4 HP Router 2 Handle	469	255
7518	3-1/4 HP 5 speed Router	534	279
7539	3-1/4HP v/spd Plunge Router	534	279
7310	5.6 amp Laminate Trimmer	176	98
97310	Laminate Trimmer Kit comp	336	198
7335	5" Random Orbit Sander	254	138
97355	7335 w/ case & dust pick-up	274	154
7336	6" Random Orbit Sander	259	139
97366	7336 w/ case & dust pick-up	284	158
73333	Dust Collection system		24.50
9853K	12V 3/8" Drill Kit w/ 2 batt	305	158
9855	12V 1/2" 2 spd,v/sp Drill Kit	310	178
8500	12V battery for above drills	Sale	45
332	Palm Grip Rndm Orb Sander	133	74
333	above sander with dust bag	148	79
334	333 Sander with PSA pad	148	79
550	Pocket Cutter with case	352	195
552	Production Pocket Cutter	1000	575
7700	10" "Lazerloc" Mitre Saw	740	409
310	Production Lam. Trimmer	270	152
347	7-1/4" "Framers" Circ Saw	230	129
347K	347 Saw w/ plastic case	250	134
743	347 Saw - left hand version	230	129
743K	743 Saw w/ plastic case	250	134
447	347 Saw with brake	259	139
843	447 Saw-left hand version	259	139
7800	Drywall Sander	589	335
7810	Wet/Dry Vac for above sander	452	259
9737	New Tiger Recipro Saw	307	165

New Porter Cable Pneumatic Nailers

BN125	Brad Nailer -18 ga. 5/8"- 1-1/4"	144	95
BN200	Brad Nailer -18 ga. 3/4"-2"	238	145
FN200	Finish Nailer -16 ga. 3/8"-2"	270	165
FN250	Finish Nailer -16 ga. 1"-2-1/2"	362	225
DA250	Angle Nailer -15 ga. 1-1/4"-1-1/2"	412	249

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Waltzing on walnut

Longwood Gardens, near Philadelphia, rates as one of the largest and finest horticultural displays in the world. It also features a most unusual floor in its conservatory ballroom. According to Bob Chenoweth in his book *Black Walnut* (Sagamore Press, Champaign, Illinois, 800/327-5557), the floor is made of black walnut salvaged from—of all things—surplus World War I gunstock blanks! The triangular-shaped blanks were split lengthwise, then laid in a parquet pattern.

Register touts top trees in USA

According to the 1996-97 National Register of Big Trees, Florida has more champion trees (146) than any other state. California, though, has the biggest of the big trees—the 275'-tall giant sequoia nicknamed General Sherman. The champion-of-champions hardwood tree, a 129' sycamore with a girth of nearly 50', belongs to Ohio. Only four states have no big-tree champions—Delaware, Massachusetts, North Dakota, and Wyoming. All in all, the Register lists the champions of some 840 different species and where they're found, as well as the 154 species that remain championless.

Published by American Forests, America's oldest conservation organization, and sponsored by the Davey Tree Expert Co., headquartered in Kent, Ohio, the National Register of Big Trees has listed the nation's largest specimens for 56 years. To find out how you can become a serious big-tree hunter, write for a free brochure to: American Forests, P.O. Box 2000, Washington, DC 20013. For a copy of the 1996-97 Register, enclose $7.95 (U.S.).

Your fair share

On the average, each American annually uses the equivalent of a 100'-tall, 18"-diameter tree for wood and paper products, the Southern Forest Products Association calculates. However, nearly 5 million trees are planted in the United States every day, which works out to five trees a year for every citizen. In fact, annual growth of U.S. forests has exceeded harvest by 33 percent for decades.

Rod Seitz stepped up from refrigerator magnets to designing and crafting scrollsawn fretwork clocks that combine contrasting woods, such as this one in oak and walnut.

A fretwork revival?

Fretwork, the art of making intricately sawn cutouts in wood, was in its heyday at the turn of the century. Or was it? The article on Minnesota scrollsaw craftsman Carl Weckhorst ("Fretwork Masterpieces") in the January 1996 issue of *WOOD®* magazine sparked hundreds of fretwork-fan letters to Carl, and many to the *WOOD* offices. Maybe it's the 21st century that will truly mark fretwork's popularity zenith!

Brenda Seitz, of Decorah, Iowa, wrote to tell us about her husband Rod's scrollsawing endeavors. Seems that a number of years ago he bartered for a used scrollsaw, then retreated to the basement and began piling up sawdust. "I accumulated more refrigerator magnets than I could ever give away," wrote Brenda. Today, Rod, helped by his father-in-law, Allen Monroe, has built a lively business around his scrollsawing. But it's clocks, not refrigerator magnets, that Rod produces these days. "I now have a bare refrigerator, but walls full of beautiful clocks," Brenda penned.

Rod does reproductions, and also designs his own patterns. For information, send a SASE to Old World Clocks, 2481 River Rd., Decorah, IA 52101.

Illustrations: Jim Stevenson Photograph: Courtesy Rod Seitz

In a durability test, the competitor's hammer lasted 60 seconds. If you happen to need one for longer than that, buy a Stanley hammer.

This picture tells the story better than any words can. In our overstrike tests, the Stanley hammer outlasted the competitor's brand by a 4 to 1 ratio.*

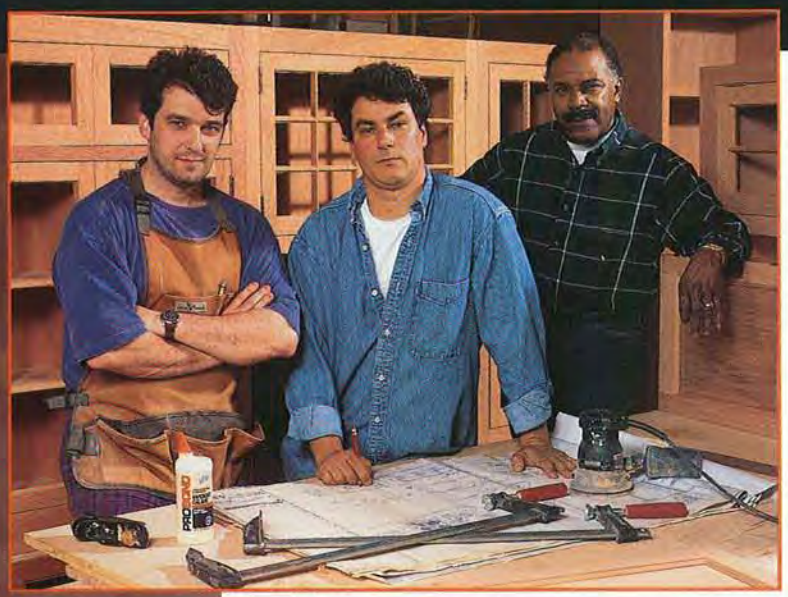
You see, after years of research (and a whole lot of sleepless nights) our engineering department concluded that jacketed, solid-core fiberglass is more durable than the compression-molded variety some of our competitors use to make their hammers.

That's the Stanley philosophy. Don't quit working until your product is perfect. You'll find this kind of dogged determination across the board at Stanley. In everything we make. Like a garage door insulated to reduce noise. Or a closet organizer made with steel planks instead of wire so it doesn't wrinkle your clothes.

It's innovative thinking like this that's kept us ahead of the competition for more than 150 years. At Stanley we're not happy simply churning out products. We're only happy when our products are better than anyone else's.

STANLEY
helps you do things right.

THESE ARE THE BRAINS BEHIND NEW PROBOND WOOD GLUE.



What happens when you listen to wood-working professionals?

A new wood glue that meets their every expectation.

Introducing ProBond™ Professional Strength Wood Glue.

The features that woodworkers want and need are formulated into ProBond Wood Glue. Extensive field testing among professionals has confirmed ProBond's outstanding performance. In fact, among those expressing a preference, ProBond was rated higher in overall quality than the leading brand.

Ease of Use Combined with Firm, Snug Bonding. A glue with strong wet tack. It sets in just 15 to 25 minutes. With minimal clamping. After curing, **the bond is actually stronger than the wood itself.**

It pours easily. It's sandable and paintable. Plus it's resistant to heat and moisture.

New Bottle Works Great. ProBond's revolutionary bottle helps get the job done fast. The size and shape fit your hand perfectly. The offset spout delivers the right amount of glue right where you want it. Every time. Even in tight corners.

We even designed the cap and wide-neck bottle to be easy to open and easy to fill.

ProBond Wood Filler is as Professional as Our Glue. ProBond Professional Strength Wood Filler has a totally unique solvent formula. Dries fast. Won't crumble. Resists shrinking and cracking. It's easy to sand. It's stainable and available in colors that match most popular woods.

So next time you need wood glue or wood filler, step up to new ProBond.

CONTRACTOR'S ELMER'S GRADE

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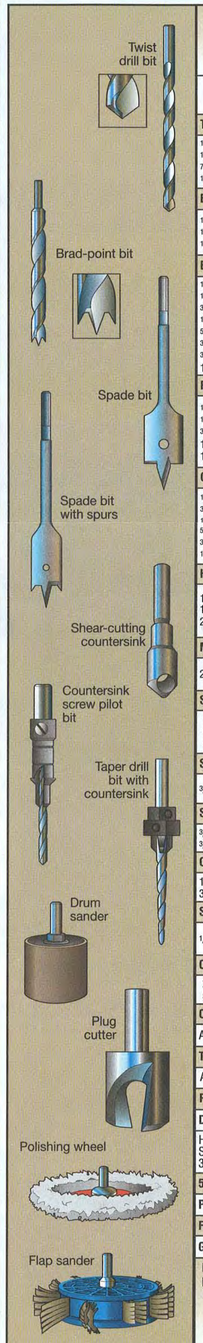
WOOD® MAGAZINE'S GUIDE TO DRILL BITS AND ACCESSORIES



DRILL PRESS SPEED CHART

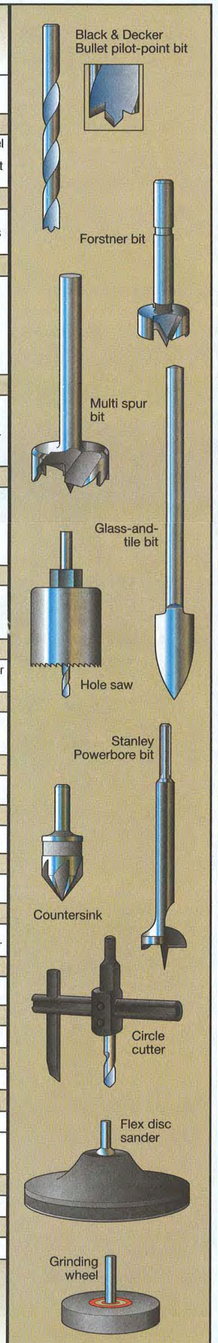
Recommended operating speeds (RPM)

Accessory	Softwood (Pine)	Hardwood (Hard Maple)	Acrylic	Brass	Aluminum	Steel	Shop Notes
Twist drill bits*							
1/16" - 3/16"	3000	3000	2500	3000	3000	3000	Lubricate drill with oil when cutting steel 1/8" or thicker. Use center punch on all holes to prevent drill from wandering.
1/4" - 3/8"	3000	1500	2000	1200	2500	1000	
7/16" - 5/8"	1500	750	1500	750	1500	600	
11/16" - 1"	750	500	NR	400	1000	350	
Black & Decker Bullet pilot-point bits*							
1/8" - 3/16"	3000	3000	3000	2000	1500	3000	Good all-around bit. These cut more quickly than brad points and twist drills.
1/4" - 3/8"	3000	3000	2400	1500	1000	2000	
1/2"	3000	1500	1600	1500	750	1200	
Brad-point bits*							
1/8"	1800	1200	1500	NR	NR	NR	Raise 1/4" and smaller bits often to clear shavings and prevent heat build-up.
1/4"	1800	1000	1500	NR	NR	NR	
3/8"	1800	750	1500	NR	NR	NR	
1/2"	1800	750	1000	NR	NR	NR	
5/8"	1800	500	750	NR	NR	NR	
3/4"	1400	250	750	NR	NR	NR	
7/8"	1200	250	500	NR	NR	NR	
1"	1000	250	250	NR	NR	NR	
Forstner bits							
1/4" - 3/8"	2400	700	NR	NR	NR	NR	Raise 1/4-3/8" bits often to clear shavings and prevent heat build-up. Make several shallow passes with larger bits; allow bit to cool between passes.
1/2" - 5/8"	2400	500	250	NR	NR	NR	
3/4" - 1"	1500	500	250	NR	NR	NR	
1 1/8" - 1 1/4"	1000	250	250	NR	NR	NR	
1 3/8" - 2"	500	250	NR	NR	NR	NR	
Glass-and-tile bits (Listed speeds are for glass and tile—not softwood.)							
1/8"	750	NR	NR	NR	NR	NR	Wear safety goggles. Use drill press only. Do not apply excessive pressure. Lubricate with water while drilling. Reduce quill pressure when bit tip emerges from back side.
3/16"	600	NR	NR	NR	NR	NR	
1/4"	500	NR	NR	NR	NR	NR	
5/16"	400	NR	NR	NR	NR	NR	
3/8"	350	NR	NR	NR	NR	NR	
1/2"	200	NR	NR	NR	NR	NR	
Hole saws*							
1" - 1 1/2"	500	350	NR	250	250	NR	Do not use with brass or aluminum thicker than 1/16". Avoid dense hardwoods such as hard maple.
1 5/8" - 2"	500	250	NR	150	250	NR	
2 1/8" - 2 1/2"	250-500	NR	NR	150	250	NR	
Multi spur bits*							
2 1/8" - 4"	250	250	NR	NR	NR	NR	Smaller sizes also available; use Forstner speeds.
Spade bits*							
1/4" - 1/2"	2000	1500	NR	NR	NR	NR	Clamp work to table to improve quality of hole.
5/8" - 1"	1750	1500	NR	NR	NR	NR	
1 1/8" - 1 1/2"	1500	1000	NR	NR	NR	NR	
Spade bits with spurs							
3/8" - 1"	2000	1800	500	NR	NR	NR	Best bit for acrylic. Clamp work securely.
Stanley Powerbore bits*							
3/8" - 1/2"	1800	500	NR	NR	NR	NR	Ideal for deep holes and end-grain drilling.
3/4" - 1"	1800	750	NR	NR	NR	NR	
Circle cutters*							
1 1/2" - 3"	500	250	250	NR	NR	NR	Drill one side, flip material over, place center bit in its hole, and resume cut.
3 1/4" - 8"	250	250	250	NR	NR	NR	
Shear-cutting countersinks							
1/4" - 3/8"	1000	1000	700	700-1000	700-1000	NR	Cuts cleaner than traditional countersinks.
	750	700	700	250-700	250-700	NR	
Countersinks							
2-flute	1400	1400	NR	NR	NR	NR	Raise and lower frequently for quicker cutting.
5-flute	1000	750	750	250	250	250	
Countersink screw pilot bits							
All sizes	1500	1000	500	500	NR	NR	Clear twist drill often.
Taper drill bits with countersinks							
All sizes	500	250	250	NR	NR	NR	Clear bit often to prevent heat build-up.
Plug cutters	1000	500	NR	NR	NR	NR	Cut to full depth so bit chamfers plug.
Drum sanders							
Hard rubber	750	1500	750	NR	NR	NR	Avoid load-up and overheating.
Soft sleeveless	500	750	750	NR	NR	NR	
3" pneumatic	1750	1750	1750	NR	NR	NR	Decrease air pressure for fine contours.
5" flex discs	750	500	500	500	NR	NR	Adhesive-backed discs work best.
Polishing wheels	1500	1500	1500	1500	2000	NR	Use light pressure.
Flap sanders	2000	2000	2000	2000	2000	2400	Hold work firmly.
Grinding wheels	NR	NR	NR	NR	NR	3000	Use 6" or smaller wheel.

NR Not recommended *Back material to prevent chip-out. **Always wear a face shield for optimum protection.**

Notes

- Recommendations are based on visual and tactile tests under shop conditions. Drilling faster than recommended can cause overheating. Speeds slower than those recommended may cause poor-quality holes.
- All testing done on face grain. Reduce speed when drilling into end grain.
- Speeds based on new bits from the factory.



4 DRILLING RULES TO LIVE BY

1 *KEEP YOUR SPEED UNDER CONTROL*

To prolong the life of your drill bits, always follow the speed limits posted in the chart at *left*. If you go too fast, the cutting edges of a bit may turn blue, a sure sign that the steel has lost its "temper" or hardness. Once this happens, the cutting edges will dull quickly, leading to poor-quality holes, a slow feed rate, and burned stock.

If a demanding task requires that you push a bit to high temperatures (say you have to drill many holes in a hard material in rapid succession), try to keep the bit cool by immersing it in water between holes. Remember, if water sizzles when it touches a bit, you're running the bit too fast. When drilling metals, use a lubricating oil.

2 *IT MAKES SENSE TO BUY HIGH-QUALITY BITS*

If you plan to use a bit often and want it to last a long time, spend the extra money for a high-quality bit or set of bits. The best bits come with sharp cutting edges that slice through wood quickly and leave smooth surfaces. They are made from high-quality steels that stay cooler and hold an edge longer. For better heat absorption they often have more steel mass near the cutting edge.

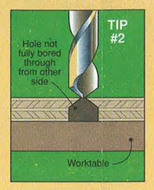
With that said, there's no denying that many of the bits being imported from the Far East are incredibly inexpensive. It may make sense for you to purchase these when you need a special bit(s) that may see limited use in your shop.

3 *AVOID GRAIN TEAROUT ON THE EXIT END OF A HOLE*

Some bits, such as brad-points, Forstners, and certain spade bits, have spurs or cutting rims on their outside edges that help prevent grain tearout as the bit exits its hole. That's because the spurs or cutting rims score the outside diameter of the hole just before other cutting edges remove the bulk of the waste material. But even with these bits, there's no guarantee against tearout. And with other bits, particularly twist bits and traditional spade bits, you can count on grain tearout.

You can do two things to avoid this problem. First, back your workpiece with a solid piece of scrap positioned on the exit end of the cut as shown at *left*. Use clamps or firm hand pressure to hold the scrap tightly against the workpiece. The scrap will support the workpiece grain against the exiting force of the bit.

If you can't back the workpiece, try the trick at *left*. With bits that have a centerpoint, drill the hole just deep enough so only the very tip of the centerpoint exits the hole. Then, flip the workpiece over, precisely center the bit over the exit point, and finish the hole by drilling into what used to be the exit side.



4 *FOLLOW A FEW BASIC MAINTENANCE PROCEDURES*

By forming a few good habits, you can greatly extend the life of your drill bits. First, place only the solid shank end of a bit into a drill chuck. The jaws of the chuck will damage the bit's cutting edges if the two make contact. You can also protect the cutting edges by storing the bits upright in a manufactured metal index, or a wooden one of your own making. And, to keep your bits from rusting, clean them from time to time with a cloth, and rub on a light coating of oil or wax.

THESE PROPERTIES DIRECTLY AFFECT PERFORMANCE

STEELS

When you're out shopping for drill bits, you'll find three basic types of materials to choose from. From low- to high-priced they are:

Alloy steels: Any package that does not claim to contain high-speed steel or cobalt bits probably holds bits made from one of many types of alloy steels. These relatively inexpensive steels are commonly used in spade bits, auger bits, and large Forstners where high temperatures are not typically generated. Twist drills, brad-points, or small Forstner bits made of an alloy steel may serve your needs for occasional work in softwoods or plastics only. In denser materials such as hardwoods, alloy-steel twist or brad-point bits will quickly overheat and dull.

High-speed steels: Bits made from one of the common grades of high-speed steel, such as M1, M2, M7, M50 or M52, hold up well to higher temperatures compared to bits made of an alloy steel. Any of these grades of high-speed steel are a good all-around choice for bits used in woodworking or occasional metal drilling.

Cobalt high-speed steel: This M42 grade of premium high-speed steel contains 8 percent cobalt. It performs exceptionally well in tough metals such as stainless steel or titanium alloys. Its extra cost is not justified for strictly woodworking tasks, but if you drill a lot of metal, these long-lasting bits will pay for themselves.

In our shop test, these bits perform best when you use a coolant such as water or oil, and apply steady, but not excessive, pressure. If you allow the bit to spin in contact with stainless steel, the surface of the stainless steel will work-harden. Because cobalt high-speed steel is hard but brittle, it may break if you try to slightly increase the size of a hole in stainless steel. For example, if you need to drill a 1/2" hole in 1/4"-thick stainless steel, drill a 1/8" pilot hole and switch directly to a 1/2" bit. Do not attempt to go from a 1/8" to a 1/4" to a 3/8" to a 1/2" bit.

COATINGS

The following coatings have little or no advantage for woodworking applications, but they do make sense if you occasionally drill metals. These coatings are typically found on bits made of high-speed steel:

Black oxide: This coating acts as a heat-resistant lubricant when drilling through metal. It helps prevent the welding of metal chips to the drill bit, and the welding of the bit to the metal workpiece. The lubrication effect also helps chip removal.

Titanium nitride: An extremely hard and thin (.0001") coating that reduces friction significantly better than black oxide. Appropriate for drilling metals under 35C Rockwell hardness (for harder metals use cobalt bits).

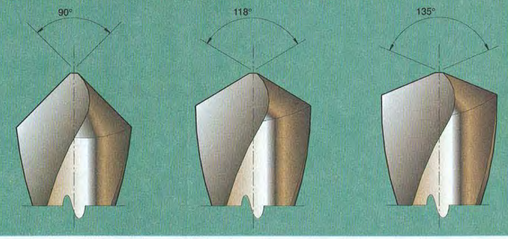
POINTS

The tip of a drill bit can tell you a lot about the bit's quality and how long it will perform well. Look for sharp, finely ground points. And, the grinding angle on the point has a big effect on how the bit performs in various materials. Here are three common point grinds:

90°: This sharp angle makes for aggressive cutting in wood and other relatively soft materials.

118°: This is a good, middle-of-the-road grind for general-purpose use in woods and metals.

135°: This point does not cut aggressively, so it holds up well in hard materials such as metals. To prevent "walking," these bits often have a "split" point to give more bite during initial contact.



MANUFACTURERS

Black & Decker
800/762-6672

CONVALCO
(premium Forstner bits)
860/793-1855

Credo
503/982-0100

Freud
(high-speed steel and carbide-tipped Forstner bits)
800/472-7307

Insty-Bit, Inc.
(quick-change brad-point and countersinking pilot bits with hexagon-shaped shanks)
612/381-1060

Irwin
(American Tool Companies)
800/866-5740

Vermont American
704/735-7464

W.L. Fuller
(premium tapered pilot bits with countersinks)
401/467-2900

Wolfcraft
708/773-4777

CATALOG SOURCES

Garrett Wade
800/221-2942

Grizzly Imports
West of the Mississippi
800/541-5537
East of the Mississippi
800/523-4777

Harbor Freight
800/423-2567

MLCS
800/533-9298

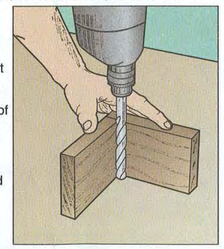
McFeely's
800/443-7937

Woodcraft
800/225-1153

5 DRILLING TIPS THAT WILL HELP YOU IN A PINCH

1 Make this simple jig for perpendicular holes in stock too big for your drill press

Some projects call for you to drill holes perpendicular to a surface. But, what do you do if the piece is too large for your drill press table, and you don't own a guide for your portable drill?

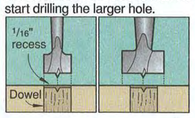


TIP: Join two blocks of wood at a 90° angle. By holding your drill bit in the corner of this jig, you can accurately bore perpendicular holes with many sizes of twist and brad-point bits.

2 Here's how to center a bit in an existing hole

Enlarging a hole in wood or other material requires a lot of guess work to start the bit in the exact center.

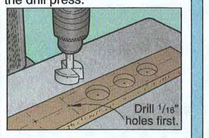
TIP: Insert a scrap of dowel the diameter of the existing hole and slightly recessed from the surface—about 1/16". Fit a drill bit the same size as the hole into the recess and rap the end of the shank just hard enough to mark the dowel center. Use this mark to start drilling the larger hole.



3 Bull's-eye alignment for large-diameter holes

Centering a Forstner bit on a workpiece can be difficult because the shape of the cutting head prevents you from seeing its point and your layout lines.

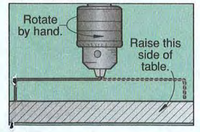
TIP: Drill a 1/16" guide hole at the centerpoint of each hole. Ease the tip of the bit into the guide hole and take care to keep it in place as you turn on the drill press.



4 Leveling your drill press table with a wire

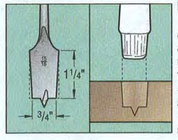
Squaring up a drill press table can prove tedious.

TIP: Instead of using a square, try a coat hanger. Cut a wire about 6" long, and bend right angles in it as shown. Don't worry if the angles aren't exactly 90°. Chuck one end into the drill. Raise the table so it touches the wire. Rotate the drill chuck 180° by hand so you can detect any high or low spots.



5 Taper a spade bit to drill snug-fitting holes for wood plugs and candles

It's hard to get wood plugs to fit snugly into the holes you drill for them. Also, when boring holes for tapered candles, a standard spade bit will not produce a snug fit. The holes will be either too large at the bottom or too small for the base to be inserted properly.



TIP: Grind a slight taper on the cutting edges of some spade bits. With these tapered bits, plugs will fit into their holes like a cork into a bottle. Just a few strokes of a file or a pass or two over a grinder will suffice. Make sure both sides have identical tapers.

For candles, modify a spade bit of the appropriate size—15/16" matches standard tapered candles. Scribe lines on the bit so it tapers from a 15/16" diameter to 3/4" as shown at *left*.

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